SB
205
A4M6

HE FARMERS' PAPER.

The Midland News

and Karroo Farmer

CONTAINS not only the Latest Cables and Telegrams, but ... of special interest to Farmers. Special ... tion and Congress Meetings, Agricul- ... terprises: indeed anything that is of ... to the Farmer we make a speciality of.

Correspondence on Agricultural and Stock problems invited.

UC-NRLF
$B 304 475

The most valuable medium in the Colony for advertising Stock of all kinds, Sales of Farms, Situations Wanted and Vacant, etc.

Printers of all kinds of Stationery, Stock Certificates, Legal Forms, etc.

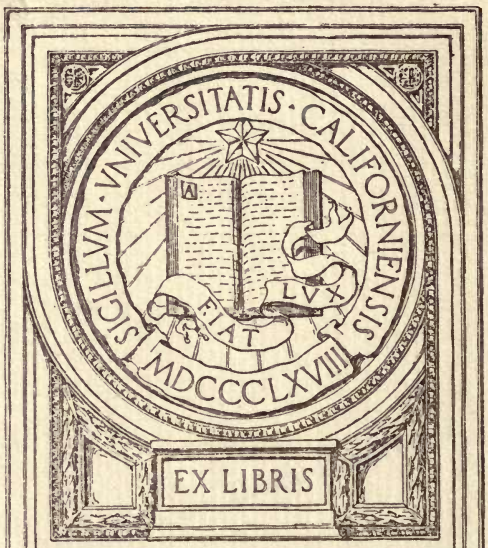
Our BUTTER PAPER,

The best value in the Colony, printed with special fast Ink.

Send for Samples and Prices to

Midland News,

Box 17, CRADOCK.



MAIN LIBRARY-AGRICULTURE DEPT

From the collection of the

San Francisco, California
2006

Univ. of California

MONEY IN LUCERNE.

THE LAST WORD IN ALFALFA CULTURE BY SOUTH AFRICAN EXPERTS AND PRACTICAL FARMERS.

SECOND EDITION—GREATLY ENLARGED.

[COPYRIGHT.]
~1908

MIDLAND PRINTING AND PUBLISHING CO., LTD.,
(PUBLISHERS OF THE "MIDLAND NEWS AND KARROO FARMER")
CRADOCK, CAPE COLONY.

SB205
A4M6

CONTENTS.

Page

"Lucerne Growing as Fodder for Stock" in Cape Colony ... 1-20
(By Edgar H. R. Evans and Oscar E. G. Evans.)

"Ostrich Farming on Lucerne" 21-27
(By Oscar E. G, Evans.)

"Lucerne in Natal" 28-35
(By L. Acutt.)

"Lucerne in the Transvaal" 36-47
(By Joseph Burtt-Davy, F.L.S., Government Botanist.)

"Dodder and its Eradication"... 49-52
(By Dr. Eric A. Nobbs, late Government Agricultural Assistant)

"Other Enemies of Lucerne" 52-53
(Various.)

"Lucerne and Dairy Farming" 54-59
(By R. Silva Jones, late Government Dairy Expert.)

"Feeding Lucerne to Stock" 60-62
(By F. Franks.)

"Lucerne Hay"... 63-66
(By R. Richards.)

"Unfermented Hay" 66-67
(By Herbert J. Collett.)

"Good Tips" 67-69
(By R. A. Hockly.)

"Lucerne for Sheep, Goats, Pigs, etc.... 69-77

"The Trade in Lucerne" 70-75

"Lucerne Mems" 76-82

"Manuring Lucerne" (Government tests) 81-82

"Lucerne Profits" 82

"Feeding Value of Lucerne" 83-85
(By R. W. Thornton, Cape Government Agricultural Assistant.)

"Lucerne Implements" 86-87

"Housing Lucerne" 88
(By R. Gavin.)

MAIN LIBRARY-AGRICULTURE DEPT.

S. N. W.

PREFACE.

AGRICULTURISTS are realizing more and more that Lucerne is a determining factor in successful farming Some men are slow in adopting new ideas, but these are being convinced by the best of all arguments—ocular demonstration. Although advance in Alfalfa growing has been comparatively slow in the past, it is now going ahead by leaps and bounds. Time was when the imagination of the farmer was captivated by large holdings and when he measured the value of his farm by the distance of the horizon. To-day a more practical criterion is demanded, and the test of value is the number of acres in Lucerne or capable of growing it under irrigation. Indeed, about the only properties being enquired for just now are Lucerne propositions.

That there is Money in Lucerne is generally admitted, and if proof were wanting it is to be found in the fact that many a farmer after feeding his own stock is able to sell hay to the value of thousands of pounds annually. The problem that remains, therefore, is how to raise Lucerne and convert it to the best possible use ; the object of this work is to solve the problem by bringing before farmers the advice of practical men, based on South African experience, and the research of scientific experts.

Eight years ago we published a pamphlet on the growing of Lucerne, consisting of Prize Essays which had been published in the *Midland News ;* it won the approval of all sections of the farming community, and was very highly recommended by the late Mr. Cecil Rhodes, who purchased a number of copies for distribution amongst farming acquaintances. That edition sold out rapidly, and a second has been long in contemplation, but the difficulty of collecting material from different parts of South Africa, prepared by men competent to deal with the subject, has consumed more time than we anticipated. Our desire was to make the work as comprehensive and up-to-date as possible, and we thought a little delay preferable to the publication of incomplete and undigested data on such a vital subject.

The present edition is the only work on the subject written from South African experience and published in South Africa. It has been written by the most successful growers in various parts of the sub-continent, but it is possible that farmers who read it may find their experience varies from that set out in this book ; it is also possible that some novices may not find in it all the information they desire. We therefore invite readers to communicate their experiences or wants to the Editor of the *Midland News*, when their problems will receive the attention of the best authorities on the Lucerne industry.

The revolution which Lucerne has wrought in stock farming has not yet been fully realized. Some farmers, as we have before

575042

stated, have been able to feed their stock and yet sell large quantities of Lucerne hay; many farmers are, however, bitterly repenting that they ever sold a pound of hay, and are declaring they will not part with a single bale in future, even if they have to keep it for three or four seasons, and we have no doubt the effect will soon be seen in the quality and quantity of meat and dairy produce in the market, and in prices being steadied.

The fact that there is Money in Lucerne is inducing farmers to put money into irrigation, which will be a permanent asset of the country.

We have been at pains to make this edition of "MONEY IN LUCERNE" as complete as possible and to apply not only to the Cape Colony but to the whole of South Africa. While at present there is practically no experience of Lucerne growing in the Orange River Colony and Rhodesia, we trust that if another edition of this work is called for we may be able to gather the results of experience in those parts. Meanwhile farmers in those Colonies will find in "MONEY IN LUCERNE" practical advice which will help them under any conditions; we shall be glad to hear the results of their experience.

We take this opportunity of acknowledging the kindness of many contributors for information given for the benefit of their fellow-farmers.

INDEX.

A

ALFALFA—History of, 1-36.
ACRE—Seed per.
—Yield per.
—Ostriches per.

B

BALING HAY, 65.
BEES AND LUCERNE—Effect on Seed, 76.
BREAKING New Ground, 38.
BROADCASTING, 40.

C

CEREALS vs. LUCERNE, 9-13.
CHICKS—Change from Lucerne to Veld, 24.
—Diseases of, at Oudtshoorn, 27.
CLIMATE—thrives in, 1-36.
COST of growing Lucerne, 13.
COWS—Stall feeding, 56.
—Mixed Rations, 55.
—Testing Milk Value, 57.
—Starvation ruins Milk Glands, 58.
—Shelter for, 58.
CUSCUTA—See Dodder.
CUSTOMS on Lucerne, 75.
CUTWORM, 2.
CULTIVATING in Transvaal, 42.
—Natal, 28.
—Cape Colony,

D

DAIRY COWS on Lucerne, 13.
—Rationing, 61.
—Stall-feeding of, 56.
—Milk-production, 54, 50.
—Unsweated preferable for, 65.
—New Zealand results, 54.
—Op blas, 8
DISADVANTAGES of Lucerne Growing, 16.
DODDER—Life history, 4, 5, 49.
—Varieties of, 50.
—How to eradicate, 5, 51.
—Illustrations of, between 50 and 51.
—Compulsory eradication, 79.
—Where proclaimed, 79, 80.
DONT'S AND MUSTS—for Lucerne growers, 46, 47.
—Don't damp Hay before feeding it, 65.
DOUBLE WATERING Seed Bed, 67.
DISTRIBUTION of Lucerne, 36.
DRY CULTIVATION, 39.
DROUGHT—Provision agnst., 19.
DRILLING Lucerne, 40.
DRAINAGE of Ground, 38.

E

ENEMIES OF LUCERNE—
—Caterpillars, 45, 52.
—Leaf-spot, 45.
—Dodder (see Dodder).
—Locusts, 52.
—Mites, 53.
EXPORT OF LUCERNE, 73, 74.

F

FATTENING—Sheep, 8, 13, 61,
—Pigs, 44, 77.
FEATHER—Effect of Lucerne on, 27.
FEEDING—to Cows, 56.
—to Horses, Sheep, Cattle, &c., 6-62.
—Pigs, 61.
—Poultry, 61.
—Horses and Sweated Hay, 65.
—Hay not to be damped, 65.
—Rations and Grazing, 66.
—Protein in Hay, 77.
FLOOD WATER, 7.
FROST—Effect on Lucerne, 6.

G

GALL-SICKNESS & Lucerne, 61.
GOOD TIPS, 67.
GRASSES—Troublesome, 2, 8.
GRAZING—How to manage, 8.
—Sheep, 8.
—Ostriches, 9-14.
—Stock generally, 60, 62, 69.
—Preparation of Stock for, 69.
—Enriches Soil, 59, 78.

GROUND—Preparation of, 2, 21, [67,
—Natal, 31.
—Transvaal, 38
—Levelling, Importance of, 31, 67.
—Double Watering Seed Bed, [67.
—Drainage, 38.

H

HARDY LUCERNE, 40.
HAY (LUCERNE)—Difficulties of making, 44.
—When to cut, 9, 63, 66.
—How to make, 64, 66, 68.
—How to stack, 64, 68.
—Heating, 65, 69.
—Judging condition, 64, 68.
—Baling, 65.
—Unfermented, 66.
—Yield per acre, 14.
—Hay and Dry Lucerne, 63.
—Keeping qualities, 17, 63.
—Feeding value, 44, 17, 69.
—Cost of making, 14, 26.
—Market value, 14, 43, 66.
—Making in Natal, 34.
—For the Military, 71, 75.
—Value in Protein, 77.
HISTORY OF LUCERNE, 1.
,, and Distribution, 36.
HONEY, 76, 77.
HOVEN, 8.

I

IMPORTS—Decline of, 71.
—from Oversea, 72.
—Value of, 72, 73.
INCREASED PRODUCTION, 70
INNOCULATING SOIL, 46.
IRRIGATION—6, 7.
—Silt, 6.
—Winter Watering, 7.
—Furrow Construction,
—Flood Water, 7.
—Misapplied, 11.
—Cost of, 13.
—to counteract Frost, 37.
—in Transvaal, 42.
—Double Watering, 68.

K

KARROO SOIL, 1.
,, Climate, 1.

L

LEAVES—Most nutritious, 77.
LEVELLING Ground—Implements for, 31. 39, 67.
LIME—Necessary in Soil, 2.
LONGEVITY of Luce r
LUCERNE—
—History and Distribution of, 1-36.
—Most suitable Climate for, 1.
— ,, ,, Soil, 1.
—Saving of, 3, 40, 41.
—Irrigation of, 6, 7, 37, 68.
—Yield of, 6, 43.
—Frost, Effect on, 6.
—How to Graze, 8.
—Hay, to make, 9.
—Cost of Growing, 13.
—Lucrative use of, 13, 23.
—Disadvantages of, 16.
—Land, Value of, 15.
— ,, Carrying capacity of, 15, 23, 25.
—In Australia, 15, 16
—Advantages of, 16.
—Locusts dislike it, 16, 69.
—Vleis and Dry Lands, 17, 18.
—Selling of, discouraged, 18.
—Stacking, 19, 64.
—Danger from Fire, 19.
—*Versus* Cereals, 9-13.
—*Versus* Veld, 24.
—Profits of, 25.
—Effect on Feather, 27.
—In Natal, 28,
—In the Transvaal, 36.
—Varieties of, 40.
—as Nitrogen Storer, 45.
—and Milk production, 55.
—and Gallsick, 61.
—Where most grown, 71.
—Honey, 76.
—Imports of, 71-75.
—Exports of, 73-75.
—Housing of, 88.

M

MANURING—Experiments at Government Station, 81.
—Effect of Phosphates, 81.
—Strength of Dressing, 81.
—Costs of Manure, 81.
—Increased yield from, 81.
—Effect on Weeds, 81.
—Potash, 81.
—Information wanted, 81.
MUSTS AND DON'TS, 46, 47.

N

NATAL—Lucerne Culture in, 28.
—Commission to C. C., 28.
—Weenen Irrigation Settlement, 29.
—Best Soil, 29.
—Rainfall, 29.
—Time and Method of Planting, 31.
—Irrigation, 32.
— ,, and Drainage, 32.
—Haymaking, 34.
—Lucerne, Value in, 35.
—Imports and Exports, 72-73.
NURSE CROP, 3, 42.

O

OSTRICHES—Grazing of, 9-14.
—Number to Acre, 14, 25.
—Farming of, 21.
—Watering of, 27.
—In Natal, 34.
—Dry Lucerne for, 66.
—Ration *vs.* Grazing, 66.
OUDTSHOORN SEED, 4, 40.
OVERSTOCKING, 68.

P

PADDOCKS—Size of, 25.
PROTEIN Experiments, 78.
—in Hay, 77.
PIGS AND LUCERNE, 77.
PROVENCE LUCERNE, 40.
POULTRY and Lucerne, 61.
PROFITS—
—On Grazing Ostriches, 25.
—Lucerne Hay, 14, 43.
POITOU LUCERNE, 40.
PLOUGHING. 2, 39.
PROBLEMS—Mr. Evans questioned, 24.

R

RATIONS—Lucerne and Crushed Mealies, 55, 69.
—Green and Hay, 61.
—*Versus* Grazing, 66.
ROTATION CROPS, 46.

S

SEED—Old preferable, 4.
—Where to obtain. See Advts.
—Dodder in, 4, 50.
—Varieties of, 40.
—Quantity to sow, 67.
SHEEP—Fattening, 8, 61.
SOIL—Karroo, 1.
—Black, 1.
—Limy is best, 2, 38.
—Depth of, 2.
—Inoculating, 46.
—Manuring of, 81.
—Suitable in Transvaal, 38.
—Iron Soil inimical, 38.
SOWING—When to sow, 4, 68.
—When to sow, Transvaal, 40, 41.
—In Natal, 32.
—Quantity per acre, 3, 40, 67.
—Broadcast and Drilling, 3, 40.
—With Nurse-crop, 3, 42.
STACKING HAY, 64.
—Ventilation of Stacks, 64.
STOCK-CARRYING Capacity of Lucerne, 60.
SWEATING Experiments, 65.

T

TAMWORTH Lucerne, 40.
TRADE IN LUCERNE—
—in Cape, 72.
—in Natal, 73.
—in O. R. C., 74.
—in Transvaal, 74.
—in Rhodesia, 75.
—Census Returns, 70, 71.
—Decline of Imports, 71.

TRANSVAAL—Lucerne in, 36.
—Parts best suited for Lucerne, 37.
TURKESTAN Lucerne, 40.
TWENTY THOUSAND ACRE PATCH, 37.

V

VENTILATION Stacks, 64.

W

WEEDS—Fatal to Lucerne, 40.
—How to Eradicate, 8, 68.
—Noxious Weeds Act, 79.

Y

YIELD OF LUCERNE, 6, 43.
WINTER WATERING, 7.

ERRATA.

Hoven—P. 8, *w*oven should be hoven.
Cuscuta—P. 4, *cascuta* should be *cuscuta*.

ADVERTISEMENT INDEX.

	Page.
Blaine & Co., Port Elizabeth, Cypher Incubators	i.
Jas. Lamb, Port Elizabeth, Produce Dealer	i.
Malcomess & Co., East London, Lucerne Machinery	ii.
Malcomess & Co., East London, Samson Windmill	iii.
Mangold Bros., Port Elizabeth, Lucerne Implements... ...	iv.
Howard Farrar, Robinson & Co., Port Elizabeth, Implements	v.
Stephen Fraser & Co., Pt. Elizabeth, Lucerne & Grass Seeds, &c.	vi.
J. O. Collett, Tafelberg, Ostriches, Horses and Cattle ...	vii.
Mosenthal & Co., Port Elizabeth, Lucerne Seed	vii.
F. W. Baker, Willowmore, Breeding Ostriches	vii.
A. P. Myburg, J.P., Pearston, Law Agent and Auctioneer ...	viii.
Abe Bailey, Arundel Stud, Arundel	ix.
"African Monthly," Grahamstown	x.
Oscar E. G. Evans, Melrose, Eastpoort Siding, C.C., Ostriches	xi.
Gingell, Ayliff & Co., Port Elizabeth, Lucerne Seed	xii.
W. Thomas, Port Elizabeth, Lucerne Seed and Machinery ...	xiii.
W. Seccombe, Coff's Harbour, N.S.W., Paspalum Dilitatum...	xiv.
"Times of Natal," Maritzburg, Natal	xv.
"Agricultural Journal & Mining Record," Maritzburg, Natal	xv.
C. Starke & Co., Ltd., Mowbray, Seeds	xvi.
C. J. Howlett, Graaff-Reinet, Trees, Plants and Seeds ...	xvi.
Butler Bros., Cradock, Stationers, Booksellers, &c.	xvi.
John Daverin, Port Elizabeth, Produce ...	Cover (back)
Arthur Mills & Co., Cradock, Chemists & Druggists „	(inside)
"Midland News and Karroo Farmer," Cradock...Front „	„

LUCERNE GROWING

AS FODDER FOR STOCK.

The Advantages and Disadvantages of Lucerne Growing, compared with the Cultivation of Cereals, especially in the Karroo, or Lucerne Growing as Fodder for Stock.

(THE FIRST PRIZE ESSAY, BY EDGAR H. R. EVANS AND OSCAR E. G. EVANS.)

LUCERNE has been cultivated for the last 2,000 years. It was known too, and appreciated by the Romans. Their name for it was *herba medica*. Botanically it is known as *Medicago* . It is rated by the progressive Australians as the "King of Fodder Plants." In Mexico, the United States, and the Argentine Republic it is known as "Alfalfa," and is extensively grown in all those great stock countries. The area under its cultivation, in all three countries, including Australia, is yearly increasing by leaps and bounds. It is well known that the prosperity of several districts of countries, such as California, Hungary, the north of Italy and south of France, depends upon their lucerne fields to a large extent. Cattle, horses, ostriches, sheep, goats, pigs, rabbits, fowls, turkeys, geese, ducks and game of all kinds thrive astonishingly well upon it, even alone. Every animal that grazes, in fact, will relish and thrive upon it. It grows best in hot countries, where the climate is dry, and it can be periodically flooded. Sub-surface water will, if constantly present, kill it right out, yet in dry, well-drained soils it is difficult to drown it by over irrigation.

KARROO CLIMATE AND SOIL SUITABLE.

There is no portion of the Karroo too cold to grow lucerne well. It thrives 1,100 feet above the sea level. Along the coast-belts it will even produce food for stock all the year round, especially if irrigated during the winter. There is no doubt that lucerne can be grown both to better perfection and with less trouble upon

the generality of Karroo soils than upon the black soils of coast and grass districts. In the black soils the growth of numerous weeds and grasses militates severely against the monopoly of the soil by the lucerne. In the reddish and yellow soils of the Karroo, on the other hand, there is comparatively very little weed and grass growth to hinder the complete establishment of lucerne upon the soil. This is a strong point in favour of Karroo soils for lucerne growing. There is still another point in their favour, and that is that most Karroo soils are well supplied with lime, whereas the generality of black soils are deficient in lime. Lucerne is a great lime feeder. It glories in a sub-soil with lime in its composition. The deeper the soil in all cases the better, but a depth of three or four feet even will grow very good crops of lucerne for many years. On shallow soils, however, manuring may in many instances have to be resorted to after a few years. Rock near the surface is very bad—nearly as bad as constant water near the surface. Some of the best lucerne soil in the Karroo that we know of lies along the Sundays River and the Great Fish River, especially where these rivers are near the sea in the lower districts.

PREPARATION OF GROUND.

The ground upon which lucerne is sown ought to be ploughed as deeply as possible, and brought to as fine a tilth as possible with the harrows, to make an even seed bed for the fine seed. The ground should not slope so much as to cause the water to run over the surface without penetrating it more than a couple of inches, nor should it on the other hand be too dead level, especially in clay soils, where drowning may take place in some spots of the field. A gentle fall is the most suitable, ensuring sufficient penetration, and at the same time no unnecessary wash and lodgment of water. The yield from lucerne on very sloping ground is almost *nil*, compared to that on ground with just a very gentle slope. In fact, on very sloping ground, it would pay better to grow some grain crop than grow lucerne. But on ground of the right tilt, we calculate that lucerne pays us at least five times better than growing wheat on the same ground. Where grasses are troublesome, the ground should be extra well ploughed and harrowed. Manuring land for lucerne is seldom or never practised in Oudtshoorn, which is at present the greatest centre of lucerne culture in South Africa. New ground especially requires no manure to grow the best crops of lucerne. We here, prefer the "ridging system" for flooding lucerne. The ridges can be made with an ordinary 75. Eagle plough, at the same time that the ground is ploughed and prepared for sowing. A single breasted J plough would be even better than a 75. plough for making the ridges. Some people make the ridges with beams bolted together in the form of a triangle; but we prefer the plough, as the ridges made with a plough are more substantial and durable.

SOWING.

The quantity of seed sown per acre varies very much in different countries and different localities. In France, for instance, as much as 30 lbs. of seed is sown to the acre. One acre measures exactly 4,840 superficial square yards; roughly about 70 yards by 70 yards. From 30 lbs. an acre in France, we find as little as 2 to 3 lbs. per acre sown by some Australian farmers in laying down sheep pastures. We know of a Colonial farmer in the Graaff-Reinet district whose standard is about 8 lbs. to the acre. But personally we have found here that it is safer to allow a good margin for loss of young plants through cut-worms, earth-fly, drought and other thinning out causes, and we have adopted the following quantities per acre *broadcast* as a safe standard, viz., 15 lbs. to the acre in freshly broken virgin soil, and 20 lbs. on old grain lands where plant food is scarce and weeds are plentiful. Lucerne is far better sown broadcast than in drills or rows. If drilled on a large scale, the inevitable weeding would entail constant and heavy expense, even if done by horse hoe. Where grasses of the root propagating kind are troublesome, the seed should be sown extra thick (say 25 lbs. to the acre), to enable the young lucerne crop to smother the grass in the struggle for mastery. The seed should not be covered too deeply under the soil. An ordinary medium heavy bush harrow will cover the seed quite deep enough. Indeed, if sown during a rainy month it needs no covering with the harrows at all, but will germinate and root splendidly simply lying uncovered upon the surface. Some people prefer to sow lucerne along with wheat, or barley, or oats, reaping the grain crop when ripe, and leaving the lucerne then in sole possession of the ground. If a "non-stooling" variety of wheat, like Italian (Blauwkoorn), or Defiance (Kaalkop), is sown, it is certainly beneficial to the young lucerne, especially if the ground is an old weedy grain-field. The wheat checks the growth of the numerous tap-rooted weeds, and thus gives the young lucerne crop a better chance for rooting and establishing itself. We do not recommend the sowing of lucerne with either barley or oats. They "stool" too much, especially oats. English oats are nearly as bad as grass for choking out a field of young lucerne. *The very best time for sowing lucerne in the Midlands is certainly in the rainy season, that is from February to the end of April.* At this season the nights are dewy, and the dry scorching winds of October to December are avoided. Lucerne germinates, and in its younger stages thrives far better under successive showers of rain, followed by dewy nights, than under the most highly approved methods of scientific artificial irrigation. We disapprove of the usual method of first watering the ground, then ploughing it, and sowing the seed in this moist ploughed ground to germinate with only the moisture in the ground. The surface of ploughed ground —unless at once rolled with a heavy roller—dries out so rapidly, that the delicate seedlings are very apt to wither and die for want

of surface moisture. In fact, a large percentage of seed sown in this way is very apt to make a false start at germination and then die, having only just burst the outer shell of the seed, when the surface moisture has given up. Hence we strongly recommend sowing in the rainy season. It is far better to sow lucerne seed in *quite dry* ploughed ground, just before the rainy season, and leave it thus for the rains to bring up when they come, than to sow it in the ordinary way in damp ploughed ground, and trusting to irrigation to bring it up and help it through the critical first two months. Lucerne may be sown all the year round of course, but for the reasons above stated, we recommend only the rainy season for sowing it, even where there is an unlimited supply of water handy for irrigating it.

Seed of one or two years old is, as a rule, better than quite fresh seed. Fresh seed has more hard grains in it than old seed, and consequently a higher percentage of the old seed will germinate. The bulk of the seed grown in this Colony is grown at Oudtshoorn, and is of excellent quality when got from reliable growers or seedsmen. Oudtshoorn seed of excellent quality, and at a price considerably cheaper than English or imported seed, can be got in large quantities from Mr. W. Thomas, of Welbedacht, Oudtshoorn. Mr. Thomas is the only seller of lucerne seed, that we know of, who guarantees what he sells to be free from "dodder" seed. We have already sown some two thousand pounds weight of Mr. Thomas's Oudtshoorn seed and have found it to germinate well, and perfectly free from the dangerous seed of "dodder." Good, reliable English seed can be got for 1s. per lb., in quantities of 50 to 100 lbs., from Messrs. Gingell, Ayliff & Co., Port Elizabeth. The ordinary seedsmen charge exhorbitant prices for lucerne seed in small quantities. Our advice to intending growers of lucerne is to buy reliable seed in quantity from reliable sellers. This is far the cheapest in the end.

DODDER.

Cascuta epithymum, or lucerne "dodder," is out and away the worst enemy the lucerne grower has to contend with. There are several kinds of dodder known by the tribal name of *cuscutaceae*. The particular variety that attacks lucerne is called *cascuta epithymum*. Dodder, in appearance, is a stringy sea-weed looking mass of leafless threads and small pods twisting round the stems and covering the lucerne infested. Dodder is a parasitic plant which attaches itself to, and lives upon, its host plant, the lucerne, to which it clings, sucking the life completely out of it and spreading from plant to plant, like a yellow sheet of fire, until the entire field is utterly and hopelessly destroyed. The germination of dodder is effected, like that of other plants in general, in the earth. The slender and simple radicle descends into the earth; if it finds no lucerne plant near it, it dies. If it finds one, it surrounds the stem

of the lucerne, and from the points of contact proceed hollow tubercles, or suckers, which suck the juice elaborated by the plant attacked. The dodder root in the soil then becomes obliterated and dies, and the dodder lives from that time forward by its suckers only. Dodder destroys lucerne attacked either by depriving the plants of their nourishment or by strangling them in their folds. It is difficult to guard against dodder on account of the rapidity of its vegetation, the facility with which it passes from plant to plant, the abundance of its seeds, and the double power which it possesses of germinating either in the earth or in the capsule. The seed of dodder resembles that of lucerne, but is considerably smaller. Passing lucerne seed through a sieve having a mesh that will allow only the dodder and smaller lucerne seeds to go through, is said to remove dodder seed from lucerne seed. But since the staying behind of even one dodder seed is the means of introducing it into a field of lucerne, where it may spread to a dangerous extent before its presence is discovered, we recommend the greatest care in the purchase of lucerne seed, and we would not touch lucerne seed known to have dodder in it, even if it passed through ten thousand sieves. Since dodder seed is difficult of detection—at any rate to the inexperienced—the buyer is entirely in the hands of the grower or seller of the seed. It therefore behoves the intending grower of lucerne to be very careful in the purchase of his seed. If he is wise he will not buy small quantities of seed from shopkeepers who do not deal largely in seeds, and have therefore no "seed reputation" to lose. Careful watch should be kept over all young fields of lucerne so as to detect the first appearance of dodder before it has spread, since *one single* plant will spread over the largest field of lucerne in a very short time if not checked. Dodder in a lucerne field is as pleasant as fire in a hay stack. It is very expensive and troublesome work getting rid of it effectually. Where dodder has broken out in a field of lucerne the following plans of dealing with it have been recommended:—Cut away the lucerne on and outside of the dodder, *carefully removing and destroying it;* then spread farm-yard manure six inches thick (when trodden down) over the whole area cleared. It is said this will kill the dodder. We doubt it. All depends on the thoroughness with which the dodder is destroyed wherever visible. Another plan recommended is to saturate the whole of the infected portion of the lucerne field with a solution of sulphate of iron (green copperas), one pound to the gallon of water. This, it is said, will kill the dodder and not injure the lucerne. We doubt it. We know an Oudtshoorn grower of lucerne who had dodder break out in his lucerne, and he told us (in spite of the copperas and other "sure cure" methods tried by him), it had cost him over a hundred pounds attempting to get rid of the dodder, and he had not then succeeded! Prevention is better than cure, saith the old proverb, and care exercised in the purchase of lucerne seed is the only method of prevention, and the only safe method.

IRRIGATION OF LUCERNE FIELDS.

It may safely be laid down as an axiom that *lucerne in its very young stages should not be irrigated.* The best germination and stand of lucerne is always found on fields which have been brought up by rain. Although lucerne has been found to be one of the very few plants that will continue to grow and to flourish under constant and repeated irrigation, yet it is injurious to flood it until it has attained *at least a couple of inches of growth* above the ground. As with all fine garden seeds, too early flooding of the small plants seems to cake the surface soil and stunt them. The surface soil being caked seems to have the effect of cutting off the necessary air supply and surface moisture, and the young crop will, as a rule, become a pale sickly green or yellow, instead of having the fresh green and the vigorous growth of a young crop in loose unirrigated ground damped by successive showers of rain. Flooding lucerne in its early stages (especially in dry weather) is always injurious. Lucerne in its early stages is as delicate as in its matured state it is hardy. Frost will quite destroy a field of young lucerne in its second, third or fourth leaf, if it happens to be standing in loose dry ground. Frost, however, has little or no effect upon the very youngest lucerne if the surface soil is quite moist. We have stated that to irrigate young lucerne is bad, but to save it from destruction by frost, when the surface is very dry, it has to be irrigated to moisten the surface. Therefore, to avoid this dilemma, do not sow it later than the end of March to the middle of May. There is no prescribed rule as to the periods between each watering for lucerne. Much depends upon the porosity and absorbtive power of the soil. For instance, in sandy soils one application of water will yield a growth of green food for a considerably longer time after it than would one watering on a tight clay soil. Generally speaking, the more often it is watered the more it will yield. In Oudtshoorn we are informed the lucerne fields are flooded about once in two months, and that only *if there is sufficient water to do this.* In some dry seasons there is not sufficient for this. In Karroo soil of a sandy alluvial nature, such as is found along the banks of the Great Fish and Sundays Rivers, we should say that even only four waterings a year would be sufficient to produce constant growth, and an enormous quantity of green fodder, probably 12 to 15 tons of valuable green fodder per acre per year, and it may be much more. On rich soil and with plenty of moisture lucerne will yield from 30 to 60 tons of green fodder per annum. But this yield is unusual and should not be calculated upon except under heavy manuring. Lucerne will yield good crops of fodder even when irrigated with quite brack water for years in succession, though, of course, the fresher the water the better. In applying flood water to lucerne it is advisable to let the very muddy water pass unused for about five or six hours after the first rush down the river. Very silty water will kill lucerne in those parts of the fields where there are

hollows. Flood water, if very muddy, should be applied to principally those fields that have the greatest amount of slope. On fields of about the right gentle slope this deposit of fine mud does not so readily take place as on quite level ground and hollows. By running the most muddy of flood water into a drain, where it is brought to a comparative rest for a few hours, it will have precipitated quite 50 per cent. of the fine silt held in suspension, and will be quite safe to use even on dead level ground. No harm at all, in fact every good, will result to lucerne that has been irrigated with the most muddy of flood water, if the surface of the soil is harrowed or scarified thoroughly immediately the surface is dry enough to admit of this operation. We strongly recommend the frequent flooding of lucerne fields during the winter months where water is available. If lucerne is freely irrigated during the winter months the moisture strikes down deep in the soil, and the crop will give a very much greater yield during the ensuing summer than if no winter irrigation had been given it. On good deep alluvial soil, lucerne fields that have been freely irrigated during the winter months will continue to yield good growth of green fodder even right up to midsummer (Christmas time) without any irrigation during the spring or early summer, however dry it may be. There is no point of more importance in laying down permanent lucerne fields than that of seeing that all the furrows are in sound working order. As a lucerne field is valuable in proportion to the frequency with which water is applied to it, the loss of valuable time and water arising from the bursting or flooding over of badly constructed furrows seriously reduces the yield of fodder from such a field in a given time. Distributing and regulating gates should be substantially erected at every point, where the laterals branch off from the mains. The great object, especially in the case of flood water, is to make the greatest possible use of the water every hour that it runs, since it does not continue to run long.

IRRIGATION.

The best way to ensure this is to construct *large main furrows* (fully six feet wide) from the weir in the river, to carry as large a quantity in as short a time as possible, and see that all the furrows are in thorough repair for rapidly and economically distributing this large stream while it lasts. If the furrows are small, and not in proper repair, it is waste of time attempting to make any real use of flood water. It is a mistake to suppose that only perennial streams, strong springs, or large dams will ensure profit in lucerne growing. For instance, one of the most valuable of the very valuable Oudtshoorn lucerne farms depends almost entirely upon flood water for irrigating the lucerne. During the recent severe drought at Oudtshoorn the water furrows on this farm never had a drop of water in them for six months! There are also some very valuable lucerne farms we know of in the Graaff-Reinet district which

depend entirely upon flood water. The valuable lucerne ground upon the Sundays River Estate is also entirely dependent upon flood water after rains. The increased use of flood water along the larger periodical Karroo rivers would cause them in time to become absolutely perennial streams. This is the experience in other countries.

HOW TO GRAZE LUCERNE.

Sometimes a young crop of lucerne will appear to be entirely mastered and smothered by weeds. Don't get scared and plough it up because it is "a failure." Turn sheep or cattle (tollies are the best) into the field, and leave them there until they have apparently smashed down and pulverised the weeds, lucerne and all. Don't be afraid they will trample the young lucerne under the weeds to death. Leave the stock on this weedy field till it is literally bare ground in appearance. Then turn out the stock and at once apply the water, and you will be surprised to find the lucerne showing up faster than the weeds. Repeat this treatment every time the weeds threaten to cover the young lucerne, and the lucerne will steadily master the weeds and take sole possession of the ground. We know of people, who have not understood this, who have ploughed up young lucerne fields, thinking they were a failure, when, if treated as described, they would have developed into flourishing fields. Running the mower over young weedy lucerne of course is the correct treatment; but where this cannot be done, the stocking plan above described answers the purpose nearly as well.

Stock should never be allowed to continuously graze on lucerne. They should be removed from the paddock as soon as the crop is eaten down to three or four inches above the ground, then apply the water to this paddock, turning the stock into the next paddock ready for grazing, and so on in rotation.

Sheep and cattle turned on *short succulent* lucerne are apt to get woven or "opblas." This rarely happens to stock upon lucerne nearing the flowering stage. Stock that are accustomed to eating lucerne should never be put into a field of short succulent lucerne straight from a dry karroo or grass camp. Let them in by degrees. Sheep placed in lucerne paddocks to fatten, if left to run in the paddocks day and night, can usually be turned off fat in from three to four weeks from date of putting them into the paddocks. Cattle take a longer time. An Australian writer (*vide Agricultural Journal*, Vol. X., No. 10, page 565) estimates one acre of lucerne will fatten eight to ten sheep. Since lucerne can be grazed some six to seven times a year, one acre would thus produce feed enough to fatten sixty to seventy sheep per annum. In districts where "fever" amongst sheep is apt to occur, it is advisable to choose from April or May up to 1st of January for fattening Merinos on lucerne. The hot months, when damp, are bad. Shedding sheep regularly at nights in fever season is said by many to be a preventive to fever.

Sheep that are rapidly putting on fat on lucerne seem very liable to fever. Where ostriches are kept on lucerne it is generally better (though not perhaps absolutely necessary) to place cattle, horses, or sheep on the field after the birds have stripped the leaves and tops in order to feed down the stubble to about four or five inches above the ground. This practice has the advantage of being a strong check upon weed growth. The weeds are left standing by ostriches, and are pounded down by the stock while clearing the lucerne stubble. This process is a very fair substitute for mowing the fields for stubble and weeds. It is, however, always *advisable to leave the late autumn growth of lucerne as long as possible* for winter use, and to protect the crowns of the plants from severe frosts. If this is done it is astonishing what a quantity of valuable green fodder is yielded by lucerne fields during the winter and early spring. In this way too the soil is shaded during the winter, and the winter irrigation moisture penetrates better, and is better retained for the ensuing summer.

MAKING LUCERNE HAY.

To make the best hay the field should be cut when the first flowers commence to appear. If allowed to go until in full bloom, or until after the plants have finished flowering, the stems become hard and woody, and unfit to be eaten by stock. During dry hot weather it is better to cut for hay making in the afternoon. Let it lie in the swath until the leaves are thoroughly wilted, but not dry and brittle; then rake in windrows and leave it awhile, and remove it from the windrows directly to the stack or to the barn. The stack is preferably made near or upon the field where the crop is cut, because every time the hay is handled the leaves drop from the stalks. The less it is shifted about the better, since the leaves are the most palatable and nutritious part of the hay. The art of making good lucerne hay is to be acquired by practice rather than by following directions, as the quality depends upon putting it in stack when just sufficiently cured to keep without heating, and is yet green enough for the leaves not to drop off. This happy mean can be acquired only as a result of practice. We therefore recommend those who intend to make this hay in any quantity, to go and see lucerne hay-making in operation in the field by someone having the necessary experience.

LUCERNE GROWING vs. CEREALS IN THE KARROO.

To begin with, the rainy season of the bulk of the Karroo comes at the wrong time of the year for the sowing and reaping of wheat. We propose to discuss wheat growing principally, as it is the cereal most largely grown under irrigation in the Karroo. The

opinion expressed by many progressive farmers in Victoria (Australia) is that "the man who grows wheat under irrigation is mad." Of course what is meant by this is that far better results can be got from good ground under irrigation than by growing wheat upon it. Crops such as potatoes, fruit trees, lucerne, vines, tobacco, &c., under irrigation on good soil will yield far greater returns per acre than wheat growing. These special crops, however, all require more care and skilled labour than cereal growing, hence, in our opinion, there is a general run on cereal growing—the lazy man's crop.

We have been often struck with a curious, antiquated idea prevailing amongst the generality of Karroo farmers, that if a man has good ground under irrigation, he "*must* grow wheat to make his own bread, and thus save buying it." The fact that he would be able, taking one year with another, to *purchase* five bags of wheat by growing lucerne where he would only have raised one bag of wheat, does not seem to trouble this "grow your own bread" farmer. We have recently heard of a Cradock farmer, with magnificent ground and water supply for lucerne growing, who has been growing wheat year after year, and only making a bare living out of it. He was asked recently why he did not try lucerne growing. He replied that he once did have a small patch of it in his lands, and found the infernal "boschje" a great trouble to eradicate from his wheat lands! He is probably still busy irrigating wheat crops for locusts and rust spores. It is the *uncertainty* about cereal growing in the Karroo that knocks the bottom out of it. If the fruitless expenses of the years of failure be taken into account, the occasional successful crop that is reaped has generally cost as much or more than it sells for. We repeat that in cereal growing the expense is exactly the same whether a crop is reaped or nothing is reaped. If a proper profit and loss account were kept over say seven years of wheat growing in the Karroo, it would be more readily seen by farmers how poor the average return is, and how much better it would pay them to turn their valuable lands over to the use and support of their livestock. Instead of doing this, however, with the perversity of human nature, they go on, year after year, grumbling at the "rottenness of agriculture," while at the same time allowing hundreds and often thousands of pounds worth of valuable stock to perish for want of food in droughts, around the very borders of their grain lands, inside of which a rust-eaten crop of wheat stands bleaching and withering, and worthless. Often the crop reaped would not pay for the hides of the stock that have been allowed to perish *outside* the fence, because *inside* the fence that blessed cereal crop was standing on the ground, the half of which would have produced fodder enough to have saved every head of stock from perishing for want of food. Good ground under irrigation in the Karroo is far too valuable to sow year after year with wheat, barley, oats, mealies and pumpkins.

LUCERNE FOR THE KARROO.

The growing of cereals should be left to those parts of this Colony and neighbouring States where they can be grown wholesale upon the slopes and hill sides for miles and miles at a stretch, without artificial watering, and depending solely upon seasonable rainfall. Regions blessed with these natural features are naturally adapted to cereal growing. These features are possessed by some of the coast districts of the Western Province—Malmesbury and Koeberg districts for instance—and some of the coast districts of the Eastern Province, and also the conquered territory in the Free State. The arid Karroo does not possess them, and instead of trying to coerce the Karroo into grain producing, it should be made to carry crops more suitable to its peculiarities of climate, soil and rainfall. Lucerne is just one of these crops. Where lucerne won't grow in the Karroo, cereals certainly will not. Cereals cannot, generally speaking, be grown in the Karroo without irrigation. Irrigation means the construction of weirs, dams and furrows, levelling and grading of lands, and the yearly maintenance of all these works. Wheat can be grown in such quantity, and so cheaply in the natural wheat regions just referred to, that the wheat grown under irrigation in the Karroo cannot profitably compete. We grant that it pays the Karroo grower of irrigated wheat better to grow wheat during a succession of years of drought, than it does during good years, because wheat is then a better price, but this state of affairs at best is merely temporary, being due to the shortfall of production in the natural wheat regions of the Colony and neighbouring States. One or two good seasons would again see wheat at such prices as can only mean loss, or at best, very little profit, to the Karroo grower of irrigated wheat ; for the increased demand, due to shortfall, will create a stimulated production from the natural wheat regions referred to. For the various reasons we have just reviewed, and because nature can never be coerced, cereal growing in the Karroo, even in favourable years, will never be more than an uncertain " head I win " and " tail you lose " sort of undertaking. It follows that all large Government irrigation schemes in the Karroo, based upon the growing of grain, and especially wheat, are more or less foredoomed to failure. Van Wyke's Vlei scheme has already proved to be a failure for wheat growing, for which it was mainly undertaken. The Steynsburg (Thebus) scheme, if undertaken, will probably be the next failure as regards wheat growing. As a wheat growing scheme the Douglas irrigation scheme is foredoomed to failure at the prices paid to acquire plots of ground upon the site of the scheme, and the water rate imposed. It will require some far more profitable crop than grain growing to enable the Douglas scheme plot holders to work at a fair profit. The only consolation left to the taxpayer is that lucerne growing, or fruit growing, will most probably, ere long, supercede wheat growing upon the sites of these Government

irrigation schemes, and thus eventually become a source of real profit and benefit to the country. With regard to the Slagter's Nek Scheme upon the Fish River, mooted from time to time these twenty years, we do not suppose that any sane Government Commission would ever seriously recommend it after a careful inspection of the nature of the bulk of the ground lying below the proposed site. There are dozens of far more promising sites and soils for large irrigation schemes within this Colony than the Slagter's Nek site. To proceed with one subject, we assume that it will be readily granted that, to grow cereals in the Karroo generally, irrigation has to be resorted to. Since lucerne is well known to flourish better under irrigation than cereals do, clearly lucerne answers better to the peculiar conditions existing in the Karroo than do cereals. Lucerne appears to be a plant "manufactured to order" for the Karroo and arid countries like it. All those countries of the world where lucerne has become to be regarded as "the King of fodder plants" are arid countries like the Karroo, principally devoted to stock farming on a large scale, and subject, like the Karroo, to protracted periodical droughts. Lucerne is in its glory in just such countries, when it is periodically flooded and then grazed or cut with the mower. The rainfall of the Karroo, or at any rate the bulk of it, is sufficient to give it this periodical flooding by taking the water from rivers, or conserving it in large dams filled from the rivers during the rainy season.

PROFIT AND LOSS—CEREALS vs. LUCERNE COST OF RAISING WHEAT.

We now propose to compare the profit of cereal growing under irrigation with that of lucerne growing under irrigation in the Karroo. We believe we are making a liberal estimate when we fix the average yield of wheat under irrigation in the Karroo at about five bags of 225 lbs. each, per acre, per annum, taking a series of years of failures and successes. Mr. John Eaton, of "Droogvlei," in the Malmesbury district (about the best wheat district in the natural wheat region of the Western Province), a good farmer of long experience, writing to the *Cape Times* in 1886, estimated the previous five years average yield of wheat per acre at $7\frac{1}{2}$ bushels, equal to about two bags of 225 lbs. each per acre. Again, from tabulated reports of wheat yields from several coast districts of this Colony, the average yield was only six to eight bushels per acre, equal to about $1\frac{1}{2}$ to two bags of 225 lbs. each per acre. The general average yield of wheat even in the United Kingdom, under scientific and heavy manuring, sure rainfall, no locusts, comparatively little rust, is only 29 to 30 bushels, or about seven to eight bags of 225 lbs. each per acre per annum. So that our estimated Karroo average (taking the good years with the bad) of five bags of 225 lbs. each per acre, per annum, must be admitted, we think, to be a very liberal estimate for a comparison between the profits

of wheat and lucerne growing in the Karroo. Of course individual yields of 10 and 12 bags, and more, per acre have been obtained in Karroo, but we are dealing with practical *averages* here. We have before us some figures on the "cost of wheat growing" in the Karroo, which appeared some time ago in the columns of the *Midland News*. The writer, who claimed to be a practical farmer, showed from actual account kept that wheat cost him just about 6s. per bag of 225 lbs. to produce. To arrive at the average clear profit per acre, per annum, we shall assume that the five bags of wheat weighing 225 lbs. each (average yield of one acre) fetch an average price of say 22s. 6d. per bag on the market, realising the sum of £5 12s. 6d. Deduct from this the cost of these five bags at 6s per bag as shown, making a total of £1 10s. 0d., leaving a net or clear profit of £4 2s. 6d.—say (for easy calculation) £4 0s. 0d. per acre, per annum.

Now, personally we have never, even in fair years, been able to make £4 per acre clear profit at wheat growing here, still less to *average* it. Nevertheless we take £4, as shown, to be a fair and liberal estimate of the average net profit per acre, per annum, derived from wheat growing. We now come to the profit per acre derived from lucerne growing for stock. By way of preliminary we may state that when once lucerne fields have been properly laid down and established, the yearly expense is almost solely confined to the mere cost of applying the water to them. On fields properly laid down, this should not exceed 5s. per acre, per annum.

COST OF GROWING LUCERNE.

We begin by quoting actual figures of results obtained recently by a leading Graaff-Reinet grower of lucerne, whose lucerne fields depend entirely upon periodical flood water diverted from the Sundays River by means of a weir across the river. This gentleman informs us that during last year (1898) of terrible drought throughout the Midlands, he made in six months (June to December) £1,300 from fattening hamels, and £700 from making butter—a total of £2,000 in six months from about 150 acres of lucerne. Deduct from this say the six months expenses of milking and tending the cows, and tending the hamels in the paddocks, say £100 for this and 2s. 6d. per acre on 150 acres for water leading during the six months, amounting to £18 15s. 0d., making a total extreme for the six months of £118 15s. 0d. This will leave a profit balance of £1,881 15s. 0d. from 150 acres of lucerue in six months, being a clear profit of £12 10s. 0d. per acre in six months, or £25 0s. 0d. per acre per annum, as against £4 0s. 0d. per acre from wheat growing. This is between six and seven times as much as from wheat growing. This too during a very severe drought. This same farmer in the year 1895 made from one ten-acre field of lucerne under dairy cows, at the rate of £5 *per month, per acre*, from butter, equal to £60 per acre, per annum—this is of course exceptional.

This gentleman was making £70 per month from butter in a drought when without lucerne he would have been quite unable to make butter at all. Lucerne makes the finest deep yellow "gilt edge" butter that fetches highest market price, and yet so little is known of "the King of fodder plants," that many farmers have a hazy idea that it gives butter a peculiar and bitter flavour!

Grazing ostriches upon lucerne paddocks is equally as profitable as making butter or fattening sheep upon this crop. In Oudtshoorn, where there are some 25,000 acres of ground under lucerne, the standard or average capacity of lucerne fields for ostriches is considered to be about ten birds to the morgen, or five birds to the acre all the year round. Double this number during the summer could be run on lucerne, but to be on the safe side the number is limited to the above. The Oudtshoorn grazing is worthless, and they have to depend entirely upon their lucerne fields for keeping their birds. The statistics for 1898 show that in that year there were 48,888 ostriches in Oudtshoorn, and these *are all entirely dependent on the lucerne*. This represents about one-fifth of the total number of birds in all the other districts of the Colony put together. Now selected birds (having feathers above the average of the ordinary stock of the country) will yield, on lucerne, at least £3 per plucking per bird, clear of marketing fees. As birds running on lucerne can be plucked regularly every eight months, without any damage to the wing, three pluckings can be got in two years, yielding a total of £9 per bird per two years. This is at the rate of £4 10s. per bird per annum. We may state that our birds have done considerably better than this, but their quality is considerably above the average. Since one acre of lucerne will carry five birds all the year round, and each bird will yield at least £4 10s. per annum, we have a return of £22 10s. per acre, per annum, less 5s. per acre expenses water leading, leaving a clear profit of £22 5s. per acre, per annum, from ostriches grazed on lucerne. This is between five and six times as much as from wheat growing. Again, let us take the making of lucerne hay as compared with wheat growing. One acre will yield from each cutting about $1\frac{1}{2}$ to $1\frac{3}{4}$ tons of cured hay, which means about eight tons of hay per acre, per annum. But to be quite within the mark, we take only five tons of 2,000 lbs. each per acre, per annum. Lucerne hay sells in Port Elizabeth at from 4s. to 5s. per 100 lbs. Take it at even 4s. per 100 lbs. average. At this price the five tons would realise £20. Deduct from this the expense of water leading at 5s. per acre, and expense of cutting and curing the five tons at 5s. per ton in stack. This would amount to £1 10s. expense, which, deducted from £20 (amount realised from sale of hay), would leave a clear profit of £18 10s. per acre, per annum, from making lucerne hay. This is from four to five times as much profit as is derived from wheat growing, and in weight it is about two or three times as much hay as is obtained from one acre of oats.

VALUE OF GROUND UNDER LUCERNE.

Even in Queensland and Victoria, where there are hundreds of thousands of acres of the most fertile grazing land, lucerne fields are found to be very valuable. At a recent auction sale of lucerne land at Bacchus Masch, in Victoria, 9 acres brought £40 per acre; 7¾ acres adjoining were sold at £60 an acre; 9½ acres at £38; 23 acres at £37; 40 acres at £30; 5 acres at £10; 4½ acres at £41 10s.; 5¾ acres at £37 10s.; and 17½ acres at £40 per acre; being an average for 122 acres of a little over £37 per acre. If lucerne land is found to be so valuable in fertile Queensland and Victoria, how much more valuable ought it not to be in the arid Karroo, where it would be the means of saving hundreds of thousands of pounds worth of valuable stock during one severe drought.

The average value of ground under lucerne in Oudtshoorn, with a fair water supply, is about £100 per morgen, or £50 per acre. Ground under lucerne on the Sundays River Estate has recently fetched at public auction £70 per morgen, or about £35 per acre. The water supply on this estate is periodical, being flood water only. The water is diverted from Sundays River by means of several sneezewood weirs, about five feet high, across the river.

COLONIAL EXPERIENCE.

We quote from the *Agricultural Journal*, Vol. VIII., No. 5, p. 121, Mr. Richard Gavin's own words, giving the stock carrying capacity of his little farm of only 95 morgen, in Oudtshoorn, most of which is under lucerne. Mr. Gavin says:—"I may mention I was the first to farm with lucerne in these parts, having tried in 1863, and imported a quantity of seed in 1866, which cost landed 2s. 6d. per lb. I had made thousands of pounds (out of it) before my neighbours took to it. Now it is an acknowledged fact that lucerne has been the making of Oudtshoorn. As an example I may mention that on my farm here of 95 morgen (about 201 acres) I have at present, in prime condition, 105 oxen, 17 cows and calves, 10 horses, 550 ostriches and a lot of slaughter sheep, and have already saved about 20 tons of lucerne hay for winter, with about five morgen under wheat and oats, and *could feed double the number of stock at present*, but am always careful not to overstock, for fear of a dry summer."

We know of a Karroo farm in the Graaff-Reinet district, now owned by one of the leading and progressive farmers of that district, which was not worth more than £3,500 at the outside valuation before it was taken in hand by its present owner. Previous to being taken in hand by its present owner, it was let at £90 per annum, and were it not for a small shop or store upon the premises, even this rental could not have been paid by the tenant.

The enterprising present owner took over this unpromising farm amid the croakings of several prophets who prophesied speedy

disaster. He set to work and built a weir across the Sundays River, at a cost of about £500, by means of which he can now flood from 150 to 200 acres of lucerne ground. Although before he built the weir and laid down the lucerne fields a tenant could not pay a rental of £90 per annum, without the assistance of the small country "shop," the present owner has been offered £800 a year rent for the same farm, and could let it at a rental of £1,000 a year if he wished. Capitalising the rental of £800 per annum at 5 per cent., the value of this farm to-day would be about £16,000, as against £3,500 before the weir and lucerne fields were in existence upon it. An Oudtshoorn lucerne farm (Zee Koegat), including a stock of about 1,500 ostriches, was recently sold for the sum of £40,000. The property is only 3,268 morgen in extent, of which about 800 morgen are arable.

There are immense fields of lucerne in Argentina, where it has taken the place of the innutritious and scanty native grasses. In the Corowa district alone (New South Wales) there are about 21,000 acres. There are individual farmers in Australia having as much as 3,000, 4,000 and 7,000 acres of lucerne. A recent Australian writer remarks: "There will be a much larger average of lucerne laid down every year, as not only the value is so much appreciated, but many owners who have let their lands on the half system for wheat have made a condition that the last year the land should be laid down in lucerne. I consider there is a great future before us in this plant." Having given a few instances of the value of lucerne ground here and in Australia, and having shown what the Australians think of "the King of fodder plants," we now proceed to discuss the

ADVANTAGES OF LUCERNE GROWING.

Lucerne fields, unlike cereal crops, are not destroyed by locusts, rust, hail and drought. Locusts seldom touch lucerne, rust does not trouble it, hail may batter but cannot destroy it like cereals. If battered level with the ground by hail, in two weeks after there will be waving a field of magnificent fodder, five or ten tons to the acre. A hail battered wheat crop, two weeks after, would be but a memory—and a sorrowful one at that. Drought that will kill lucerne, when once it is properly established, will kill the hardy Karroo itself! A field of lucerne, when once established, will last, like a fruit orchard, for years; and will require comparatively little yearly expense and attention to maintain in a state of profitable production. In Oudtshoorn there are fields 15 to 20 years old as good and better than they were ten years ago. In Graaff-Reinet there is a plot of lucerne said to be about 70 years old—probably self-sown from time to time. In New Mexico there are said to be fields which have been under this crop for more than 100 years. The revenue or profit from lucerne fields is both far greater and far more certain than that from cereal crops in the Karroo. To the

Karroo stock farmer especially, lucerne is of inestimable value. It is one of the hardiest, yet heaviest yielding of fodder crops. If water cannot be given to lucerne fields for six or eight months no harm results. In the case of cereal crops they would be destroyed. When after six or eight months drought, water is again available for lucerne, this accommodating crop is ready to commence yielding enormous quantities of valuable fodder at once. With lucerne there are no yearly or half-yearly ploughings and sowings, as in the case of cereal crops. With the small area of 50 acres of lucerne at his command, no Karroo farmer need lose a single head of stock in the severest drought. With a mower and a horse rake he can cut from this 50 acres, *during one year,* fully 250 tons of the most nutritious fodder for feeding his stock during droughts. One ton of lucerne hay would often be the means of saving £100 worth of stock in a drought, and this one ton would only cost 5s. to cut, cure and stack! £100 return for a 5s. investment ought to be, in mining phrase, a payable proposition.

Lucerne hay does not deteriorate if not used at once. Professor Wallace gives an instance in Australia where a stack of lucerne hay was perfectly good, more than seven years after it was put up. Lucerne hay is not eaten and destroyed by mice and rats as is the case with oat hay. The nutritive value of lucerne hay is, besides, much higher than that of oat hay. There is a curious notion among most Karroo farmers that lucerne hay is "no good *alone*" for feeding to horses in hard work. They fancy that there *must* be oat hay, barley, or mealies added to the lucerne hay to give "substance."

On this point we quote the following remarks recently-appearing in an American agricultural paper, the *Louisiana Planter*:— "Alfalfa hay is one of the richest foods for stock; it takes the place, in the farm dietary, of wheat, bran, cotton seed meal, &c. It is suitable *alone* for young growing animals and *horses at heavy work.*" The italics are ours, and we trust that this quotation of American opinion and experience will dispel from their minds the erroneous idea prevailing amongst most Karroo farmers as to the want of "substance" in lucerne hay. We may here remark that the high nutritive value of lucerne itself has been clearly demonstrated at the well-known scientific experimental fields at Rothamstead, in England, where over a period of six years lucerne yielded an average of about 153 lbs. of nitrogen per acre, per annum; whereas over a period of eight years vetches gave an average of only 84 lbs., Bokhara clover only 70 lbs., and red clover only 14 lbs. of nitrogen per acre, per annum, as against 153 lbs. per acre from lucerne.

Lucerne growing may be carried on very profitably on many farms which to-day are considered "dry farms." There are thousands of such farms, even in the driest portions of the Korroo, which have fairly large watercourses or sluits, looked upon as dry rivers because they have no springs rising in their bed, and consequently are not perennial streams, but yet have catchment areas of

from 15 to 50 miles traversing them. Generally speaking, on the banks of these sluits or "dry rivers" beautiful level stretches of deep alluvial soil may be found. By erecting barriers across these dry rivers in the form of earth dams or stone and wire dams, the water may be deviated from the channel formed by years of wash, and turned out on the level stretches, which, if sown with lucerne, and given a thorough flooding every time the rains traverse the watershed of the "dry river," would give large crops of lucerne, which could be cut in the rainy seasons and stacked for use in times of drought. At odd times a great deal of green "pickings" could be got for ostrich chicks or for running sheep on. In this direction great advances are being made in this country, and it may be confidently asserted that when full advantage has been taken of every spot where lucerne can be profitably grown in this country, it will make a difference of millions to the annual revenue of the Cape Colony.

There are also many spots in this country called "vleis," which always have a certain amount of moisture in the soil, which can be easily detected by the green appearance of the rushes and other growth on them. By sinking on these "vleis" water is generally found anywhere between 20 and 40 feet. Such spots are ideal for lucerne culture. Lucerne above all things abhors standing water about its stems. This kills it off very quickly. Nor does lucerne thrive where standing water is to be found as near the surface as two or three feet. There is the old saying that lucerne does not like wet feet; but if the water is 15 or 20 feet below the surface, the lucerne will thrive excellently, and once the roots get down to the moisture, good crops will continue to come on even in dry times. Lucerne thrives and grows marvellously on the banks of the Mooi River, in the Transvaal, where the water is only a few feet below the surface, probably not more than from 2 feet to 10 feet, but here the water is supposed to be moving under the surface, and not stagnant, which makes a great difference in its effect on the lucerne.

The selling of their lucerne hay by stock farmers cannot be too much deprecated. How often does it not happen that a farmer sells his hay at 4s. or 5s. per 100 lbs. in the early part of the season, when everything looks promising for a good year, and by the end of the season when a drought has developed he would pay double and treble what he sold for to have the stuff on his farm. He then cannot obtain it, as those who have it are requiring it to save their own stock. Thus the farmer who sells his hay very often loses hundreds of pounds worth of valuable stock through having sold his hay, while the money value received for his hay would not cover one-sixth or one-tenth of his losses in valuable stock.

It is a safe axiom for every stock farmer to stack and stack, and continue to stack, every pound of hay that he cuts. In this country of ours, with its fickle seasons, the day is as safe to arrive as the sun is to rise in the east when the lucerne stacks will be a god-send to him.

In view of the danger of fire, it is as well not to put too much stuff in one large stack. If there are thirty loads of hay, rather build three stacks than one. In building your stacks, place them so far from one another, that in the event of one catching fire it can burn out without setting the next one alight. Thus, in the event of a fire, you would save two-thirds of your hay by having three stacks, whereas if all was in one stack the whole lot would be swept off.

RESTING THE VELDT.

And, lastly, we would draw special attention to this very important advantage of lucerne growing to the Karroo farmer. It enables him to relieve and *rest* portions of his stock-tramped veld by grazing most or all of his stock upon his lucerne fields during the growing and rainy seasons, and thus allow the useful grasses and bushes to grow out and to seed for the much-needed improvement and renewal of his pasturage.

He is thus enabled to put into practice the highly beneficial "paddocking system" of grazing pastures, as practiced in Australia and elsewhere. This system of alternate *rest* and use has been found to quadruple the carrying capacity of pastures. Thus does lucerne growing not alone yield in itself a far better yearly return per acre than cereal growing, but it is also the means of bringing about a steadily increased stock-carrying capacity of the whole farm.

There is no denying the statement that drought is the one great drawback to the Karroo, the main leakage through which the Karroo farmer's profits filter away from time to time. Drought may, in fact, be said to be the great consuming dragon of the Karroo farmer's profits; there are few Karroo farmers, indeed, who have not felt his terrible fangs. Surely the drawing of this dragon's fangs should be worth the doing! The providing of artificial fodder for stock against drought is the only forceps that will draw them. The man who allows his stock to perish for want of providing water would be looked upon as mad by the very man who allows his stock to die by thousands for want of providing food. It is, however, difficult here to distinguish between the sane and the insane. It would seem that a man is mad only when he behaves differently from his neighbours.

Finally, then, we come to the

DISADVANTAGES OF LUCERNE GROWING.

There is no doubt that the initial outlay required for properly laying down permanent lucerne fields of any extent is considerably heavier than that required for ordinary cereal growing. This feature about lucerne growing is perhaps, in the strict sense of the term, not a disadvantage, yet it would have the effect of deterring the farmer of limited means from taking up lucerne growing. As

in the case of fruit orchards, the lucerne grower who has just started must be prepared to wait a year or two for a return upon his outlay.

Lucerne fields yield very little the first year, and not much the second. From the second year onward lucerne becomes profitable, although it is said not to be fully matured till about the fifth year. Most Karroo farmers cannot afford to wait for a year or two for a return upon outlay, and prefer to continue ploughing for cereals year after year, even if five out of ten years they are only feeding locusts and rust spores.

Yet it is precisely the farmer of limited means who stands most in need of utilising to the very best advantage the means at his disposal for extending his limited capital. The advantages of lucerne growing are therefore of more importance to the farmer of limited capital than to the well-to-do farmer.

Ostrich Farming on Lucerne.

PAPER BY MR. O. E. G. EVANS, AND INSTRUCTIVE DISCUSSION THEREON.

AT the meeting of the Cradock Farmers' Association held in October, 1907, Mr. O. E. G. Evans' paper on "Ostrich Farming on Lucerne." was read, as follows, the writer himself being unable to be present :—

Mr. Chairman and Gentlemen,—

I have to thank you for the honour you have conferred on me by asking me to get up a paper on how to make money out of lucerne.

By your syllabus I see you have relegated to me the handling of this subject from the ostrich farming point of view. Gentlemen, this is a very wide and a very elastic subject, and I can only very diffidently put forward my views, which I hope will be of some use to your Association as well as to my brother farmers.

PREPARATION OF LUCERNE LAND.

To begin with, I have to touch on the laying down of lucerne. It is of paramount importance that ground where lucerne is to be sown should be levelled off very carefully and given a very gentle slope, just enough for the water to flow (say about 3 or 4 inches in the 100 yards). This is very necessary to obtain a good yield from your lucerne. If your ground slopes too much, my advice to you is to put down any other crop sooner than lucerne. For the reason that lucerne once down is down for a number of years, and with water leading continually, the ground becomes hard and no penetration of moisture whatever takes place on these slopes. Not so with cereal crops, as these are ploughed afresh every year when down, and consequently, in leading water, the ground, though ever

so sloping, is always in such a loose condition as to enable soakage of water to take place. On such sloping spots a good cultivator even would be of little use, as when the ground is loosened it would only tend to wash. Well, gentlemen, I have now cleared the ground so far, that you will know that when I speak of lucerne, I mean lucerne grown on good, level lands and under good conditions. I wish it clearly understood that I am not contending that ostrich farming is the only way of making money out of lucerne growing. I moreover do not wish specially to champion this particular method of making money out of lucerne growing. As this branch has been relegated to me, I can only state my experience and views, and must leave it to those who have knowledge of other means of deriving a good return from lucerne, to judge for themselves the relative merits of the various methods of making money out of lucerne. There is no more marvellously accommodating plant than lucerne, and there is money to be made out of it in whatever way you farm it. For instance, there are climates and altitudes which may not suit the ostrich, here you could turn it to profitable account in dairying, fattening sheep, fattening cattle, fattening and rearing pigs, converting it into hay for the market, or converting it into ensilage for your stock. I would only submit, gentlemen, that where the conditions are favourable, farming ostriches on lucerne is a very lucrative proposition. We have this corroborated by the figures shown in the income tax returns, where it is stated that 75 per cent. (I think I am right in this) of the farming population of this country who paid income tax last year were ostrich farmers in the Oudtshoorn district, farming on lucerne.

A BUSINESS PROPOSITION.

It would seem to me, gentlemen, that the ratio of yield or return in this branch of lucerne farming lies a good deal in the hands of the farmer himself. The farmer has only to raise the standard of quality in his ostriches, and he immediately raises the level of his income. We all know that breeding by selection in ostrich farming has only been in vogue for a decade or so. There are isolated cases where far-seeing farmers have bred by selection a little longer, but I allude to its becoming a fairly general practice. An ostrich in the early days was valued as an ostrich, regardless of the quality of feather which it produced. To-day an ostrich is valued by the quality of its feather and the strain it is out of, quite as much as any thoroughbred sheep or goat is valued by the quality of its fleece and the strain it is from. We find to-day that hundreds of pounds are paid for good ostriches, whereas thousands of common birds go begging in the market at £3 or £4 each.

I would like to point out that since the advent of ostrich farming on lucerne, it is felt by the farmer that there is a great deal more stability in the industry than before. It was a haphazard

business before when the farmer felt that with every little wave of dryness his birds suffered and often died, while his clip of feathers was immensely deteriorated. Under adverse conditions of this kind the industry could not forge ahead, as no farmer was going to invest in expensive ostriches to improve his herd, while he was thus subject to the tender mercies of our fickle seasons. I therefore contend it is to lucerne growing we owe that keen desire and determination amongst farmers to improve their stock at almost any price; the farmer finding that the better the class of his birds the better is his income from his lucerne.

Now to come to the L.S.D. In Oudtshoorn we know it is computed that you can keep 5 ostriches to the acre of lucerne. This calculation is based on grazing the ostriches continually on the lucerne. If, instead of grazing them continually, you graze them for say two hours per day, and then remove them to a dry paddock and there feed them on green lucerne cut up, you will find that you can keep this number of birds fat during the summer months, and yet spare sufficient lucerne to cut and convert into hay to keep the birds on during the winter months and up to the time that the lucerne again starts growing. So that under favourable conditions and by judicious grazing and cutting, I feel that 5 ostriches to the acre is not an extravagant calculation. But yet, gentlemen to satisfy the most supercilious critic we will reduce the number of ostriches to 3 to the acre. Thus we will be allowing ample margin for the inherent weakness of our country, *instability*, which instability again can in turn be laid at the door of the irregularity of our rainy seasons. However, this is by the way. We all know that ostriches of no particular pretentions to quality will produce £5 per plucking on lucerne. Then again it cannot be denied that good ostriches will produce £10 per plucking and more on lucerne. We will therefore again take the medium here and calculate each ostrich to produce £7 10s. per plucking.

It is usual when feeding on lucerne to pluck every 8 months (I have done this all my life, and to-day have ostriches of 10 years old still producing feathers which take their place in prize bunches). Plucking every 8 months means 1½ pluckings per year. This at £7 10s. per plucking means £11 5s. per ostrich per year. Calculating the low rate of 3 ostriches per acre of lucerne, this gives you a return of £33 15s. per acre. Put your expenses at £3 15s. per acre, this will mean a nett return of £30 per acre of lucerne. Gentlemen, this is purely off feathers.

We now come to the increase in chicks. Where high-class stock are kept this line gives a big return. One pair, or a set of three good ostriches will produce £750 worth of chicks in the year. This pair or set of ostriches will thrive on one acre of lucerne, and the chicks can be reared up to the age of selling on another two acres of lucerne. Thus from these three acres of lucerne you get a return of say (minus expenses) £700. Now it would be manifestly unfair to calculate the return from your lucerne on this fabulous

scale. Yet I wish to point out that where a well-established lucerne farm exists with about 100 acres of lucerne and high-class ostriches, you can safely add £10 per acre of lucerne, over and above the sale of feathers, to your income, from this direction, thus bringing the total return to £40 nett per acre of lucerne.

PROBLEMS OF PRACTICAL MEN.

At the November meeting Mr. Evans was present, and answered the questions of a large and deeply interested audience.

Mr. E. T. Gilfillan asked the relative value of the product of birds fed on lucerne and of others fed on good veld.

Mr. Evans thought the difference would be quite 35 or 40 per cent. in favour of the bird fed on lucerne. Of course there was such a vast difference between veld and veld, and between veld in one season and another. The advantage of lucerne fed birds was that their product was uniform; the birds were always in good condition.

Mr. E. T. Gilfillan remarked that he specially said *good* veld. What Mr. Evans said was borne out in the practical experience of men in the Uniondale district, some of whom put the difference at 75 per cent.

The Chairman (Mr. Herbert Collett) said his experience was that if the veld was *very good*, the product of the veld fed birds was as good as that of lucerne fed birds.

Mr. Evans emphasised that birds on lucerne were in uniformly good condition season in and season out; that was where lucerne scored. For instance, if birds were drafted from the veld to lucerne when the former was going off, they got fat quickly, and the effect was seen in the feather, which was not so good as that of the bird constantly fed on lucerne.

The Chairman: There is always the danger of leaving birds too long on the veld, with a consequent falling off in the quality of the product.

Mr. Davidson: But if the veld is good, do you think the difference in quality between veld fed and lucerne fed birds is sufficient to compensate one for not selling his lucerne hay? Would it not pay better to sell the hay in such case?

Mr. Evans: There may be circumstances in which it is better to sell your hay, but if you have valuable ostriches—which are the only ostriches we should strive after—then it pays you to keep them in *uniform* condition, to use *all* your hay and lucerne rather than run risks of having birds lower in condition at one time of the year than another, and so jeopardising the return from your feathers. If you have a low class of birds, then it does not pay to feed them on lucerne, and in such a case it is better to sell your hay and not to farm ostriches at all. As far as returns from good and inferior birds are concerned, there is as much difference as between those of Persian sheep and Merinos.

Mr. H. Abrahamson: Is there not a danger of transferring chicks bred on lucerne lands on to the veld?

Mr. Evans: No; if the veld is good they will rather benefit by the change. I have had long experience of this, and the result of it is that it has no prejudicial effect whatever. Of course I draw the line at birds being taken from lucerne and placed on the dead Karroo.

The Chairman concurred.

Mr. Abrahamson: Is the stamina of chicks reared on lucerne the same as that of birds reared on the veld: would they stand a drought as well?

Mr. Evans said he had had his lucerne lands so dry that the dust rose from them as from the veld, and he had had to feed on mealies and prickly pear, but his losses had never been as many as those of his neighbour. He had had hundreds of birds running on the veld, and could not say they had suffered before anyone else's, and they were all reared on lucerne.

Mr. Christian: How many birds may be run per acre of lucerne watered in, say, the months of December, January and February? The advantage of knowing this is obvious, because then we can estimate the quantity of hay we shall require for the rest of the year, and can stack accordingly.

Mr. Evans: I think you can run from 8 to 10 birds per acre of lucerne, well watered and in good condition, and they will keep fat on it. During these months birds can hardly eat the lucerne as fast as it grows.

Mr. P. Coetzee: What size paddocks do you recommend?

Mr. Evans: From 10 to 15 acres. If you have 400 or 500 acres of lucerne, I should say make your paddocks from 20 to 30 acres each. I have only 100 acres, and my paddocks average 10 and 12 acres, with a few smaller ones for chicks or special purposes. My breeding camps are 70 by 70 yards for a pair of breeding birds.

Mr. Coetzee: And when you irrigate your camps do you keep the birds in?

Mr. Evans: Only the breeding birds, not the others. Birds tramp down the crown of the plants and harden the wet paddock so, which is the worst thing that could happen in a lucerne paddock.

In reply to Mr. Abrahamson, Mr. Evans said he put birds into the lucerne when it was from 9 inches to 12 inches high. The birds stripped off the leaves and left the stems; it was then his practice either to put in cattle to eat off the stubble or else to mow it and stack it for cattle in the winter; they eat it readily. He had tried leaving it on the ground for manurial purposes, but it was a mistake, because the mower, raking it up, clogged the machine and spoiled the hay.

A PROFIT AND LOSS ACCOUNT.

At this stage Mr. Evans said that he noted that Mr. Christian at the former meeting seemed to think the figures he gave in his paper were extravagant; he (Mr. Evans) had gone farther into the subject, and now gave the following detailed statement.

EXPENDITURE ON 20 ACRE PIECE OF LUCERNE RUNNING 3 OSTRICHES OF £20 EACH TO THE ACRE—AT PER ANNUM.

Suppose the birds graze for 6 months per year only, which is giving a big margin for dry times, *one cut* from the 20 acres of ground will produce 20 tons of hay, which (at 4 lbs. of hay per bird per diem) will feed the 60 ostriches for 6 months. To cut this hay will cost as follows:—

Cutting 20 acres Lucerne—1 man and child, at 2s. for man and 6d. for child—to take 2 days at 2s 6d. per day...				£ 0	5 0
Horse Raking—say 1 man for 2 days				0	4 0
Turning Over and Cocking—say 5 men, 2 days				1	0 0
Riding Hay out to Stack—say 5 men, 2 days				1	0 0
Total cost of food for 60 ostriches for 6 months ...				£ 2	9 0
Water Leading for 1 year—say 1 man, 2 days each time, and 7 waterings per year = 4s. 7 times				1	8 0
Furrow Cleaning - say 10 men, 2 days twice in a year				4	0 0
Fence Repairs and Maintenance—say £2 per annum				2	0 0
Plucking, Feeding, Quilling, &c.—say 1 native by the month, at 15s. and rations, say £20 per annum					0 0
Farming Plant—Light wagon	£ 30	0	0		
6 mules, £15 each	90	0	0		
Horse rake	10	0	0		
Cultivator...	15	0	0		
Mower	15	0	0		
Trekgoed	5	0	0		
Odds and ends	5	0	0		
Total ...	£170	0	0		
Interest and depreciation on above £170, at 10%...				17	0 0
Interest on Capital in Birds—say 60 birds at £20 each = £1,200 at 5%				60	0 0
Interest on Capital in Ground - say 20 acres at £50 each = £1,000 at 5%				50	0 0
Total				£156	17 0

RETURN FROM 20 ACRES OF LUCERNE, RUNNING 3 OSTRICHES TO THE ACRE = 60 OSTRICHES.

Feathers from 60 Ostriches, at £7 10s. per plucking and 1½ pluckings per annum = £11 5s. per bird	£675 0 0
Chicks from 60 Ostriches—say 60 reared up to the age of 6 months. From birds of £20 class, chicks are worth £6 to £10 each at 6 months. Say chicks are taken at price of £6 each and allow 15 to make up wastage and loss, thus leaving 45 for sale at £6 each	270 0 0
	£945 0 0
Deduct interest on capital in land, stock, farm plant and depreciation, also expenses of farming as above	156 17 0
	£788 3 0

Thus the nett return per acre works out at £39 9s.

Under fair circumstances more hay can be produced (at least 10 to 20 tons more) and more chicks can be reared and sold, and the wastage can never attain what I am allowing.

Mr. Evans said if gentlemen thought he had over-estimated he would be glad to hear what they had to say. For the class of bird he based his calculation on, he thought the figures were not excessive.

Mr. Christian said at the last meeting the stock farmers present wanted to hear more about the value of lucerne, and seemed to think the figures might be overdrawn. He would like to know the difference lucerne made to the feather—to quill, flue, length and otherwise.

Mr. Evans replied that lucerne feeding toned up the feather generally. The quill might be a little larger, but the flue would be stronger and the lustre of the feather more brilliant.

Mr. Coetzee: If you run birds on lucerne, do you water them daily?

Mr. Evans: It may seem very cruel, but I never water my birds, whether on lucerne or on the veld. If in dry times I have to feed on dry hay, I give a ration of prickly pear. In most of my veld camps, however, there is water, but I know for a fact that birds at the far end of the camp never come to water. I think ostriches are like springbucks in this respect. I have known springbucks to be fat after running on the veld for six months in drought without water.

Mr. Coetzee remarked that he had known ostriches run for six months without water, but nevertheless they would drink freely daily if given the chance.

Mr. Christian said his experience in Albany district was similar to Mr. Evans's in this regard.

The Hon. Secretary (Mr. J. Butler) remarked that when in Oudtshoorn recently farmers were told that the ostrich men there could not breed chicks any more; that the average reared was only 5 per cent. It had not transpired whether that was owing to deterioration of the stamina of the bird through being always fed on lucerne, or through some disease arising through overcrowding, or some cause peculiar to the district.

Mr. Evans replied that this was due to overcrowding. He had spoken to many Vets. on the subject, and they were afraid one of these days there would be an outbreak of some disease there owing to overcrowding birds in the paddocks. The water there passed from one valley to another, carrying whatever there was of disease germs with it. At present they in the Karroo were in the happy position of having no infectious disease amongst their birds, but he always quaked lest something should turn up from Oudtshoorn.

The Chairman said they in the Midlands had the advantage that they could turn their birds out on the flats.

Mr. Evans said many Oudtshoorn farmers did not expect to rear more than 25 per cent. of their hatches, but they were a well-contented people there, and satisfied with that.

This closed the discussion.

Lucerne in Natal.

(By MR. L. ACUTT.)

ALTHOUGH this King of Forage Plants has been grown in the Cape Colony for many years, it is only recently that it has engaged the attention of farmers in Natal and been grown on any large scale. It is true that it has been grown in small quantities and in different localities for some considerable time, and its value as a forage plant has been recognised, and fair supplies of green lucerne have found their way to the chief local markets, but until recently, one may almost say within the last two years, no cured lucerne hay has been offered for sale. The reasons for it not having been produced on a larger scale appear to me to have been :

(1) The first trials did not happen to be upon the most suitable soil and under the most favourable conditions as regards climate and water supply.

(2) Difficulty in obtaining a satisfactory stand, owing to dry seasons, want of knowledge as to the right time of seeding, unsuitable preparation of the land and want of know edge as to treatment and cultivation after sowing.

In consequence, farmers, after giving it a trial and not meeting with success at once, have abandoned it as a main forage crop in favour of the more cer ain oathay and mealies.

Some few years ago, however, attention was called to the success attending the cultivation of lucerne in the valleys below the Weenen Irrigation Settlement. This was still on a small scale, but in spite of distance from market (some 45 to 50 miles of ox wagon transport over bad roads to reach Estcourt railway station), it was found profitable to send cured hay to market.

Farmers in the Weenen Irrigation Settlement took the matter up, and the soil and other conditions being favourable, met with success, but even so recently as two years ago, the largest field under this crop was only 18 acres in extent. The results were most satisfactory, and knowledge as to preparation of land and time of seeding were gained.

COMMISSION TO CAPE COLONY.

In January, 1903, the Land Board of Natal decided to send a Commission to the Cape Colony to visit the lucerne districts, and obtain information with regard to lucerne and irrigation, and the suitability of lucerne as a crop for the lands of the farmers on the

settlements under the control of the Board, of which settlement the Weenen Irrigation area already mentioned is one.

The Commission consisted of Mr. R. Yorke Worthington, of Weenen, and myself, and we received every attention from the Agricultural Department of the Cape Colony, and visited Robertson (Breede River), Oudtshoorn, and the Strathsomers Estate on the Sundays River.

SOME RESULTS.

Our joint report on our tour was published in the *Natal Agricultural Journal*. Lectures were given at the different settlements, and a great impetus was given to the enterprise as the result, partly of the information so given, and partly, and perhaps mainly, by the object lesson which the settlers had before them in the small fields already under lucerne; and, although the time was short, a good deal of land which was being prepared for crops of oats, mealies, potatoes and tobacco for spring planting, was hastily got into condition and sown with lucerne in March and April.

As a result of Mr. R. Yorke Worthington's observations during our tour in the Cape Colony, he and his partner acquired a large property at the junction of the Bushman's River with the Tugela, and are sowing lucerne on a larger scale, and probably have some 200 or 300 acres under crop at the present time, and are already harvesting and marketing a large quantity.

The farmers on the Weenen Irrigation Settlement have very good prospects before them; they will be connected very shortly with the main Railway System of the Colony by means of a narrow guage light railway, their land is evidently suitable for the growth of lucerne, and there is an ample water supply.

It is safe to say that at present over 1,000 bales of cured hay are being marketed monthly, and this must be considered satisfactory, as we have not a field which can be, in a Cape Colony sense, considered "established"—that is, there is no field in which the plants have become deep rooted, and consequently no field is producing what it may be expected to do in a year or two's time.

The quality of the cured hay so far marketted is, I am assured by dealers, equal to any they have ever handled.

SUITABILITY OF LUCERNE FOR DIFFERENT LANDS.

Undoubtedly the best land for the growth of this crop in Natal is that formed at the bends and deltas of rivers from detritus resulting from the denudation of the land in what is known as thorn country, which covers a large area, and the soil of which is fertile, but in places too steep and stony for cultivation, and besides, where arable, the rainfall is too low to sustain crops. This land more nearly resembles the Karroo of the Cape Colony than any other, and I consider that the flats which exist on the banks of the rivers in this "thorn" country consist of soil which will be found

as fertile as the best land in the Cape Colony on which lucerne is grown Such land is very limited in Natal, and is bound to command a high price in the near future, wherever it is within practicable distance of a railway.

On any other land which can be irrigated, lucerne will probably be found to be one of the most valuable forage crops which can be grown.

But it must be remembered that lucerne is not a crop which demands irrigation, as it is claimed for it that it sends its roots down far enough to reach permanent water, and so becomes independent, to a great extent, of rainfall; this point is largely overlooked in South Africa generally, and so farmers look to irrigation as absolutely necessary to the successful culture of lucerne. The point of course is, that without rainfall at the proper time while the plants are establishing themselves, where irrigation is not practicable there may be disappointment and failure to get a good stand, as a hot wind after sowing, or a few days of very dry weather may prevent the germination of the seed, and so the season may be lost, but it is worth persevering in, to ultimately get a full field, and there are many stretches of deep rich soil, where irrigation is impossible, but where the rainfull is sufficient, if only the initial difficulty of establishing the lucerne can be got over.

So far as climate is concerned, I consider it probable, from the great range of temperature under which the plant is grown all over the world, that it will grow anywhere in the Colony where the soil conditions are favourable. It grows well on the coast, on hill sides without irrigation, but is, as might be expected, difficult to establish.

The following remarks by Professor C. A. Zavitz, of the Experiment Department of the Ontario Agricultural College, Guelph, Canada, will be found to be of use to intending lucerne farmers :—

> "It is found that in some localities and on some farms the alfalfa proves successful, while in others it is sometimes a total and sometimes a partial failure. The causes of the failure seem to be poor seed, killing out the first winter, and unfavourable conditions of the subsoil. The character of the top soil does not seem to exert as much influence as that of the subsoil; the best results are generally obtained where the subsoil is a gravelly or sandy loam, and is naturally well under-drained."

It is impossible for anyone to say what lands will suit lucerne other than the class of land already experimented upon, and I should therefore advise, where it is proposed to cultivate lucerne, that the land be tested by digging small pits to ascertain the character of the subsoil which, according to the authority quoted above, is such an important factor.

PREPARATION OF LAND.

There is nothing particular to be said under this head. A very fine seed bed is necessary, and the same cultivation which is ordinarily done for any small seeds will of course do for lucerne, only, as the crop is such a permanent one it is worth while going to a little more trouble.

At the Weenen Irrigation Settlement I have seen land prepared for sowing in a manner which left very little room for improvement, and lucerne farmers can get full information on this point from Weenen settlers, or from other parts of this book.

While, however, the preparation of the land for lucerne seed differs little, if at all, from that for any fine seed, the matter of the levelling of the ground before sowing is of the utmost importance. In the first place, the more perfect the levelling the better will the mowing machine do its work, and the closer will it cut—a very important point. Again, the more even the land is, and the freer from lumps and hillocks, the more easily and thoroughly can it be irrigated with a given supply of water. It will be said that this equally applies to any other crop, and this is so, but whereas with annual crops the yearly cultivation, ploughing and harrowing in preparing the land for the next crop will bring the land into a more level condition year by year until it is perfect, with lucerne once planted there is no chance of levelling hillocks, or doing anything to the surface; therefore, that which in the case of other crops can be spread over years, must, as regards lucerne, be done as much as possible before sowing. Very great attention is paid to this point in the Cape Colony. At Weenen I saw the ground being levelled by a heavy railway rail being drawn over it, a team being hitched to either end, and this appeared to me to be a most effective way of doing the work.

TIME OF PLANTING.

In the districts where lucerne has been grown so far, April is decided upon as the best month for sowing or drilling, and it is found that only by sowing about this time of the year can a good stand be got. I saw a field which was sown in January which was a perfect failure, while some adjacent fields sown in April were looking splendid and would crop by the following September or October. For untried districts it is impossible to say which is the best time to plant or sow. I have heard of some January sowing on our coast lands which did very well. In America I find, on reference to books on the subject, that sowings are always made either in the early spring or late autumn.

METHOD OF SEEDING.

Where the land is fairly clean, sowing broadcast is to be much preferred to planting in drills, as it covers the ground more quickly

when sown than when planted in rows; any few bare places showing can be filled up by scattering a few seeds and raking them in. In land which may be expected to produce a heavy crop of weeds, as in the case on our coast lands, it is considered preferable to plant in drills a foot to 15 inches apart, the land can then be more effectively kept clean.

Some experimental plots put in on the coast were planted with Japanese millet between the rows; this acted as a protection from the sun and wind, and proved successful. In sowing also, oats are often sown with the lucerne as a "nurse crop," but the plan is not favoured unless under special circumstances, such as exposed situation, sand drift or great heat rendering it necessary to provide protection for the young plants.

Most of the sowing which has come under my notice has been done by machines, which work with the most marvellous accuracy where the land has been properly prepared, and when the weather is favourable, that is, neither too dry nor too wet.

IRRIGATION.

I may just touch on this point, but as the whole industry of lucerne growing is in its infancy, very little is known as to the best times to irrigate, how much water to use, etc., for in the present lucerne districts the supply of water is practically unlimited. At present water appears to be led on to the ground in quantity after every cutting unless there happens to be rain, but there is a feeling that irrigation may be overdone, and some of the best farmers are providing for drainage, as some patches of soil already showed signs of becoming water-logged; and probably, as time goes on, much less water will be used.

CULTIVATION.

So far nothing has been done to the fields in Natal after they are once sown and the land well covered, that is, there is no cultivation by ploughing or harrowing between cuttings; I can therefore only give some information on this point for the guidance of farmers, which I selected from standard works on the subject.

Professor J. C. Haney, of the Kansas Agricultural College, writing of the use of the disc and harrow on alfalfa, says:—

> "It is demonstrated beyond doubt that alfalfa must have some cultivation to secure its best development. Statements of what it is possible to do for this plant with the disc or other harrow can scarcely be credited without demonstration. But cultivation with these will make alfalfa succeed in many places where it is now pronounced a failure, and will increase the yields and permanency; after the first season's growth the alfalfa has rooted so deeply that it will withstand a surprising amount of surface disturbance. A thorough harrowing with a sharp harrow the spring after seeding and

after each cutting, especially if the surface soil is dry and crusted, will do a surprising amount of good. After the alfalfa is two or three years old, the disc harrow can be used, and the alfalfa should be disced at least each spring just as it starts. Disc both ways with the discs set nearly straight and weighted, then harrow down smooth. The disc destroys all surface rooted plants, and does not injure the deep, sturdy rooted alfalfa. The cutting and splitting of the crowns invigorates the growth and thickens the stand.

"Our first experience in discing alfalfa was in 1898; a field had been seeded to alfalfa in the dry year of 1894, and a poor stand resulted, crab grass was thick and the stand of alfalfa so thin that it was not worth keeping. Late in March, 1898, this field was harrowed with a disc harrow, the discs sharp and set at as great an angle as possible; it was immediately cross disced with the discs set the same way. The ground was thoroughly pulverised and the alfalfa apparently destroyed. It soon started, branched out quickly, and we made three good cuttings from the field that summer. In 1900 we went a step further in discing alfalfa.

"Two fields of alfalfa two years old were disced—one field was disced March 28th. The first cutting made May 31st, disced June 6th; the second cutting for hay made June 25th, disced June 27th; the third cutting of alfalfa made August 13th, and the alfalfa disced for the fourth time on August 25th. The last cutting of alfalfa was made September 13th. This shows four discings and four cuttings of alfalfa on up-land in a dry year. The alfalfa in both fields made fine late full growth, and went into the winter in good condition. From these experiments we feel safe in recommending discing all alfalfa of two years standing or more. Make the first discing early in the spring, and then disc immediately after each cutting. If the stand of alfalfa is fair to good, set the discs at a slight angle. If the stand is poor, and the growth of crab grass thick, set the discs to cut deeply. Discing is of as much value to alfalfa as cultivation is to corn."

The foregoing will not perhaps commend itself to the present lucerne growers in Natal, as there would appear to be no immediate necessity for cultivation between crops, but later on I think such cultivation will be advisable, as the plants will probably show a tendency to form tussocks.

Where, however, lucerne is grown on up-lands without irrigation, the directions quoted are invaluable, for they show how a field of lucerne which has come up badly, and which is crowded with coarse grasses, and which is apparently a total failure, can be brought into a good yielding condition without doing all the labour of ploughing, preparing seed bed and sowing over again, besides saving perhaps a whole year in time.

HAYMAKING.

With regard to this important operation, we have very little to guide us, nor can any experience gained in one or two districts enable us to lay down a hard and fast rule for the whole Colony. The climate varies so much within a few miles, or rather the rainfall so varies, that one man may be able to harvest successfully in a certain way, while his near neighbour would suffer heavy loss if he harvested in the same way. One thing is very certain, and that is that, even in the driest districts of the Colony, a considerable amount of shedding will be necessary to protect the crop and ensure its being properly cured in all weathers, and in this respect we must look forward to our hay-curing costing us more than it does in the Cape Colony, with a rainfall of only a few inches a year against our average of some 40 inches. The wet weather at times will seriously hamper harvesting operations, in spite of any amount of shed room, and probably in wet seasons losses by wet will be by no means infrequent.

MARKETS.

Of course our lucerne growers, looking forward, do not figure on the prices now obtainable being maintained, and they do not view with any alarm the almost certainty of a considerable drop in price. It is considered that if a farmer can get £4 a ton for cured hay on rail, it will give a better return per acre, and for the capital employed, than feeding it to stock, but as we get more experience this view may not prove to be correct. But let the price drop, as it is bound to do, and it will pay farmers to go in for ostriches, which are doing fairly well in some districts of the country.

I do not think we can look to Johannesburg as a market which will absorb a large quantity of lucerne, as I believe the Transvaal will be able to grow all the produce of this description which may be required, but an almost unlimited amount of this fodder can be used in Natal so soon as the price drops sufficiently to stop importation. We have a large stock-raising country within 20 or 30 miles of the lucerne country, and towards winter stock is to be bought which would probably not go through the cold weather, but which would fatten in the warmer climate of the thorn country with good feeding on lucerne.

Again, it is not unlikely that stock farmers would find it to their interest to supplement their own grown supply of winter fodder with lucerne, as being, if not actually weight for weight cheaper, calculated with their own stuff to make a better balanced ration.

The above are a few of the outlets for our lucerne which occur to me, but it is such a universal food that there are doubtless countless other ways in which it can be used, and I do not fear that lucerne will drop in price below the figure which farmers are at present quite expecting to face.

ADVANTAGES OVER OTHER CROPS.

The first and perhaps main advantage is the quick return. I have before me the certified figures of the return from 18 acres of lucerne, which show that within 11 months of seeding, produce was sold to the value of £107, or nearly £6 per acre, besides which, the first crop, with which there was much self-sown oats, was fed to stock, as it would not make marketable hay. The crop, after this return was taken, was then in a condition to give a cutting every 5 or 6 weeks, and the return for the next 12 months would be more than doubled. Compare this with other crops; after reaping the farmer would have had to plough and harrow his land again, and wait nearly a year before getting any further return, and probably have to spend a heavy sum in manure.

ENEMIES.

The two great enemies of the Natal farmer, locusts and hail, do not seriously affect lucerne. Locusts will not touch it at all, while as regards hail, there may be one severe storm in a year, and this storm, if it caught the lucerne when it was approaching the cutting stage, would ruin that crop, one out of perhaps seven or eight which would be harvested in the year.

Lucerne requires no annual expenditure for manure as most other crops do.

Again, when once "established," a long spell of severe weather (whether of drought or wet, to which our climate is so liable), which would be fatal to almost any other crop, would scarcely affect lucerne, or only temporarily.

CONCLUSION.

In offering these notes on Lucerne in Natal, I feel that they are very meagre, but the cultivation of lucerne on a farm scale is of so recent date that very little experience has been gained which could be collected for the benefit of intending growers. I trust, however, that what I put forward will tend to increase that interest in the crop which is already considerable. I would say that from what I can see, and gather from works on lucerne, the South African climate is most suitable for the crop; and when farmers have disabused their minds of the idea that lucerne can only be grown on land which can be irrigated, and realise that there is a great future for lucerne on our up-lands, I feel confident that in a few years thousands of acres will be under this crop, and that very few farms in any part of the Colony will be found without their field of lucerne.

LEONARD ACUTT, J.P.,
Member Natal Land Board,
Tongaat, Natal.

Lucerne in the Transvaal.

By JOSEPH BURTT-DAVY, F.L.S.,

(Government Botanist, Transvaal Department of Agriculture).

HISTORY AND DISTRIBUTION.

LUCERNE is one of the oldest of our farm crops to have been brought under domestication. It is a native of Central Asia, and was introduced into Europe by the Persians when they invaded Greece under Xerxes in 590 B.C. From Greece it was carried into Italy and Sicily. In North Africa it is known by its Arabic name of "alfalfa," which indicates that it was introduced there from Arabia, during one of the several invasions by the Arabs. Under the same name it was carried into Spain, probably by the Moors. When the Spaniards conquered, and settled in, Mexico and Chile, they took alfalfa with them, and it soon became one of their most important crops. From Mexico or Chile they carried it into California. The date of its introduction into Argentina is not clear, but it has not been grown on the present large scale for more than about 20 years; it is probable, however, that it was grown there on a smaller scale for many years before.

California and the other South-western States of North America, Argentina and Mexico are now the largest growers of lucerne. It is also produced successfully in parts of Australia, especially along the Hunter River and in the Tamworth District.

CLIMATE.

It is thus evident, from the history and distribution of lucerne, that it is primarily a crop of warm temperature countries. A closer inspection of the areas of cultivation also shows that it is grown most successfully in arid and semi-arid countries, often on the borders of deserts, as well as actually within them where irrigation can be applied. In the Colorado Desert of Southern California, where the average rainfall is only *two inches* per annum, crops of lucerne six feet in height are secured under irrigation.

Lucerne also thrives both in colder and more humid climates, being grown in England, in Canada, and in the North-eastern

United States, in some places with a rainfall of 65 inches; but under these conditions it does not, and indeed cannot, give such satisfactory results as in regions of greater warmth and more sunshine. It is essentially a sunshine-loving plant; but a certain amount of frost, while it retards growth, does no harm to the stand. Any danger of injurious effect from a severe frost may be reduced by the application of a winter irrigation.

IMPORTANCE.

The wide distribution of lucerne is an indication of its importance, but anyone who has seen the enormous stretches of country in California and Argentina, which are devoted almost exclusively to this crop, cannot fail to be impressed by it. One California grower alone has no less than 20,000 acres under lucerne.

Governor Hoard of Wisconsin writes:—"No one more literally abets the growth of two blades of grass where one grew before than he who effectively urges the cultivation of alfalfa upon those who are strangers to it, and no one is more truly working for the benefit of agriculture, the basis of all prosperity, than he who proclaims its excellence as the foremost forage."

Its value lies in its high nutritive qualities, its heavy yield, its perennial character, and the longevity of well-cared-for stands.

PARTS OF THE TRANSVAAL BEST SUITED TO LUCERNE.

In general terms it may be stated that lucerne will grow anywhere in the Transvaal, provided the soil is suitable. But it would not be safe to start laying down large areas, even on suitable soils, in every district in this Colony.

The most satisfactory results have been obtained on the deep, alluvial soils, in the valleys of rivers having their rises in, or having tributaries from, the Dolomite. There are some excellent lucerne lands of considerable size along the Vaal and Mooi Rivers.

On the western slopes of the Drakensberg, in the eastern portion of the Carolina, Ermelo and Wakkerstroom districts, the attempts at lucerne growing have not been very successful, and it is possible that Dutch clover *(Trifolium repens)* will there give better results. At Piet Retief, however, a few good crops of lucerne have been grown.

On the Springbok Flats in the Waterberg District, in parts of Zoutpansberg West, and in much of the South-western Transvaal, a good deal of difficulty has been experienced in establishing stands of lucerne on dry land, on account of the uncertainty of the rainfall and the intensity of the heat during dryspells, which burns up the seedlings. When irrigation can be practised this trouble need not be feared.

SOILS.

The roots of the lucerne plant penetrate to great depths in search of plant food and moisture, and it thrives best where the soil is sufficiently deep and permeable to allow it to do this.

Deep, alluvial loams of medium consistency (neither excessively light and sandy nor very heavy) give the best results. Shallow soils produce poor crops and the stands are but short-lived.

The chemical composition of the soil has some influence on the succeeding crop, but not as much as is sometimes supposed; good crops are produced on soils of very diverse chemical character. Lime is a valuable adjunct to a lucerne soil, but soils not rich in lime may produce good crops, other things being favourable.

Among the Romans, and at the present day in Provence, ironstone soil is considered inimical to the good growth of lucerne. This may not be due to the presence of an excess of iron so much as to the impermeability of the comparatively thin stratum to which the iron is mainly confined, as in parts of England. Whether both or only one of these factors cause the trouble, we find that lucerne does not succeed where the form of iron deposit known as Transvaal "oo'klip" occurs near the surface.

Poor, light, sandy soils are not conducive to the production of good stands of lucerne.

Sour, peaty soils, such as are found at high altitudes in some of our eastern districts, have not, so far, proved satisfactory.

The land must not be swampy. The water-table (upper limit of the ground water) should not rise nearer the surface than six feet, even in summer. Stagnant water causes the roots to rot; the lucerne root is most sensitive on this point. Some plots of low land at the Botanical Experiment Station, Pretoria, have been entirely drowned out, although the water did not stand on the surface.

PREPARATION OF THE LAND.

My experience is that newly-broken veld is unsuited to lucerne, and this view is confirmed by the experience of American growers. It is particularly the case in the Transvaal, where the veld is so full of deep-rooted perennial weeds which are not removed nor killed by the ordinary surface plough, but which are rather stimulated to more vigorous growth. This applies more particularly to sour veld. The land should either be fallowed or cropped for the first season with some cleaning crop such as manna or teff-grass; American growers recommend that this be done for at least two seasons.

In order that the seedlings may find sufficient moisture to carry them over a period of dry heat between rains, it is necessary that a thoroughly deep and fine tilth should be prepared, which will retain the moisture. Some growers consider that as much care is required in the preparation of the soil for lucerne as for an onion

seed bed. For this purpose deep ploughing, followed by the sub-soiler, is desirable.

Great care is required in levelling the ground so that the water may flow over it evenly and uniformly. If there are elevations in the field the lucerne plants on them do not receive an equal proportion of the water, and the stand becomes uneven with a resulting reduction in yield. The excess of water, which then flows into the hollows, runs off and is wasted; it does not benefit those plants which it reaches, whereas if evenly distributed there need be no waste.

IRRIGATION versus DRY LANDS.

Wherever it is possible to do so, lucerne should be planted under a well-laid-out irrigation scheme rather than on dry land.

In parts of California and Argentina it has been found practicable to grow lucerne without irrigation. It has been suggested, therefore, that in the Transvaal, where irrigation water is scarce, and where summer rainfall is by no means inconsiderable—much higher, in fact, than in the lucerne belt of California—it might be possible to grow it as a summer crop, without irrigation; we have therefore been carrying out an extended series of experiments to determine this point. At the Botanical Experiment Station, Skinner's Court, Pretoria, we have stands of lucerne on unirrigable land which are now 4½ years old, and which have given as many as four light cuttings in a favourable season, though only two were obtained in the dry summer of 1907-08. The growth of the plants on this soil, which is heavy clay-loam with a pot-clay sub-soil, has never been as vigorous on the unirrigated as on the irrigated lands, and the cuttings are never heavy. This is partly due to the fact that on dry land the growth is less succulent than on the irrigated field, but the yield of hay is also less. My conclusion is that though on such soils dry-land lucerne will not be a success as a forage or hay crop, it gives a useful amount of early spring and late autumn grazing. At Potchefstroom, on a poor, thin soil overlying an iron-stone gravel, the growth has been far less satisfactory. On the deep alluvial lands of the Vaal River near Vereeniging, dry-land lucerne sown two years ago has made an excellent growth, and yielded several cuttings of hay. At eight months from seed I found specimens 28 inches high, and bearing 36 stalks from a single crown. A good crop has been obtained this season on dry lands in the Kaap River Valley, near Barberton. Before we can draw final conclusions from these experiments, it will be necessary to see how the stands persist.

The subject is worth continued and persistent experiment. The amount of irrigable land in the Transvaal is so limited, and so much of it is required for other crops, such as wheat and winter forage, that it would be a great advantage if good dry-land stands of lucerne could be secured. Although the results so far obtained

are generally disappointing, it should be remembered that it is one of the most difficult crops to establish. Success is being had in the growing of lucerne in the parts of the United States where not more than three years ago it was deemed impossible to make it live; we may, therefore, yet attain success with dry-land lucerne in South Africa.

VARIETIES.

The Transvaal Department of Agriculture has tested all the principal varieties and strains of lucerne known. Of these the best results have been obtained with Australian seed from the Tamworth and Hunter River Districts, and with Oudtshoorn seed. The Oudtshoorn seed sent to the Transvaal has so often been found to contain quantities of dodder and other weed seeds that our farmers naturally hesitate about purchasing it, even at a lower price than that paid for imported seed. Australian seed has usually been quoted at higher figures than any other. Almost equally good is the Provence strain, grown in the South of France; the Poitou seed, from the North of France, has not given such good results, and is probably better suited to a more humid climate.

The Turkestan and "Hardy" varieties have been tried repeatedly, but have not proved satisfactory in a single instance; as a rule the Turkestan starts spring growth later in the season than any other sort, and has given a lighter yield per acre.

Many persons suppose that the alfalfa of California, Argentina and other Spanish-speaking countries is a different variety, but this is not the case.

DURATION OF STAND.

One of the valuable characteristics of lucerne is the long life of a well-grown, well-kept stand. In the States and in Provence its usual duration is from 10 to 25 years. Professor Coburn reports a field in New York State that has been mown successfully for over 60 years, and I have heard of similar cases in Mexico and Cape Colony. In France it has been known to flourish for more than a century, and in Mexico it is stated that there are fields which have been continuously productive for over 200 years. But where care is not taken to prevent or check the growth of weeds, the stand rarely gives a profitable yield after 7 or 8 years.

It is natural that such a deep-rooted and long-lived plant should not come to maturity the first year. As a matter of fact it is not till about the third year that the full crop is secured.

SOWING.

On irrigated lands lucerne may be sown either in drills or broadcast. On dry lands it should only be planted in drills. 15 lbs. will drill an acre, but broadcasting requires 25 lbs.; at 1s.

per lb. this means a cost of 10s. per acre more for broadcasting than for drilling. In addition to this, drilled lucerne sometimes gives a much larger yield per acre than that which has been broadcast, so that the advantage is all in favour of drilling.

On dry lands the drills should be 9 inches to 12 inches apart, as the plants do not spread much, but under irrigation it is desirable to space the rows to 15 or 18 inches on account of the tendency of the crowns to branch laterally.

Weeds are fatal to good stands of lucerne; it is therefore of the greatest importance that the seed used shall be absolutely clean and free from weed seeds. Where so much seed is imported from abroad there is danger of introducing new and noxious weeds. There is also a tendency to dump on the South African market any old seed of poor germinating power which will not sell readily in other countries; where such high prices are paid for imported seed, it is wasteful to buy any but the best. Lucerne seed of 90 per cent. purity and germination, for which 1s. per lb. is paid, actually costs 1s. $1\frac{1}{3}$d. for every pound of the seed that grows. Where only 9d. per lb. is paid, but the combined germination and purity do not exceed 50 per cent., the actual price is, of course, 1s. 6d. for every pound of the seed that grows. It is therefore much cheaper to buy good seed, of high purity and germination, at 1s. per lb., than poor seed of low germination, at 9d. per lb. But it is not only a question of the actual cost of the seed; poor seed gives a poor stand, and a poor stand gives a poor crop. With a permanent crop like lucerne the stand should be as perfect as it is possible to make it, in order to secure full returns.

On irrigated land which is absolutely clean of weeds it may sometimes do to sow in early spring, thus getting the stand established before the weeds have much chance to get ahead. Many of our weeds wait till summer is well advanced before starting vigorous growth. This course is, however, very risky, for there is danger from late spring frosts, and there is sometimes as great a tendency for the lucerne plants not to "come away" quickly as there is for the weeds to grow slowly; the same influences affect both; if the lucerne pushes ahead, the weeds are apt to do so too.

Our experiments carried on during some five years, in every district in the Transvaal, on practically every kind of soil, and in almost every month of the year, show that sowings made during the latter part of summer and early autumn, from the middle of January to the middle of March, give far the best stands; by this time the weeds are harmless, having passed their prime and exhausting themselves with seed. The lucerne seedlings continue growing as long as there is any moisture available, until late on in the winter, and are thus well prepared to rush into vigorous growth with the first warm weather of spring. This does not mean, however, that one can even then afford to sow lucerne in *foul* land. A certain proportion of weeds will appear in the cleanest of land, but

these will be mastered by the lucerne if the latter is given a fair chance; but it is a fatal fallacy to suppose that lucerne is strong enough to overcome any and all weeds. This is not the case; in fact, this crop is more seriously injured by weeds than most crops of which we have had experience.

IRRIGATION.

The amount and frequency of the irrigations must depend largely on the character of the soil.

On heavy, black-turf land I find one irrigation per crop is sufficient if applied immediately after the last cutting; this means one irrigation per month, as I average one crop per month during the season.

On the lighter, red loams of the Irene Estate, Mr. Van der Byl finds it necessary to give two irrigations per crop, or one in about two weeks.

Paradoxical though it may seem, it is often better to irrigate during a light rain or in cloudy weather, than during hot, dry weather. There is thus less loss of water by evaporation, and the water soaks deeper into the soil.

But in a capricious climate like that of the Transvaal it would not do to wait for cloudy weather before irrigating. Irrigate as soon as the crop is off the land, but do not hesitate to do so because the weather is threatening rain or is rainy.

By irrigating immediately after a crop is removed, a new growth is started without delay, and the loss of moisture which would otherwise inevitably follow the baring of the surface, is checked.

NURSE CROPS.

Owing to the fact that lucerne does not give heavy crops in the first year, there is a great temptation to sow a nurse crop with it, in order to get some crop off the land the first season. It is also supposed that the nurse crop will protect the young lucerne plants as it does with a crop of "seeds" in Europe.

In this as in many other cases, however, theory is not confirmed by experience. The theory may be correct as far as it goes, but the trouble is that it does not go far enough. In climates which suit lucerne best, a nurse crop takes too much moisture out of the soil, so that the lucerne seedlings suffer. This is our experience in the Transvaal, and it is abundantly confirmed by that of American growers.

CULTIVATION.

I have already referred to the injurious effect of weeds. It remains to discuss the best method of treatment to avoid their growth. I know that some farmers pooh-pooh weeds, and consider that it is not worth while to remove them; this is one of the main

causes of failure with this crop. I have already shown that with careful treatment the life of a stand of lucerne may be anywhere from 25 to 100 years. It is evident, therefore, that such a crop is well worth a little extra care. When we consider that it takes three years to reach full maturity, and that a good stand will yield ten tons of hay per acre per annum, worth here at least £4 per ton, a little care and attention which will save the necessity for ploughing up and replanting, with the corresponding loss of crop, is well worth the little extra cost.

Our most successful growers use some of the many forms of cultivator, which can be run down the rows as soon as the soil is dry enough after each irrigation. A harrow is then run across the field at right angles. This loosens the surface soil and checks evaporation, at the same time that it kills the seedling weeds which have been started by the irrigation. Surprising though it may seem, I find that the yield of crop is greatly increased by a single cultivation. Owing to the large amount of farm work to be done during the summer, it is not always possible to use the cultivator after every cutting; but I find that three or even two cultivations will sometimes suffice, if a harrow is used after each of the other cuttings.

One great advantage of drill over broadcast sowing is the greater ease and less cost required to keep the crop clean of weeds. Our 4½-year stand is as clean to-day as when it was first put in, and with no more care or expenditure than could be applied on any farm.

It is important that we should clearly understand that lucerne is an expensive crop to lay down and to keep in condition, that it will not give the best returns without care and attention, and that it does not pay to neglect the crop.

YIELD.

The great variations in our seasons, the extremes of heat and cold, moisture and drought, produce great fluctuations in yield in a crop like lucerne. A normal crop under ample irrigation should give six to eight cuttings per annum, yielding eight to ten tons of hay. I have known of heavier returns.

After the war, the first growers of lucerne made good money by selling green lucerne in the bundle, on the markets of Johannesburg and Pretoria. With the rapid increase in production and the decrease in demand owing to the reduction of the military forces the price quickly fell. Only those with exceptionally good facilities, and close to the market, now find this method of marketing profitable.

A good deal of money is still being made by the sale of baled lucerne hay, from £4 10s. to £7 10s. per ton (colonial) being realised. But here again the demand is falling while the supply is increasing, and soon we may expect that only those who are par-

ticularly favoured by being close to a market will find it profitable to sell baled hay.

The sooner we cease to depend on the direct sale of our lucerne, either green or baled, the better. The sooner we come to the point of making our lucerne "walk to market on its own legs," as the Yankee expresses it, the sooner shall we be on the highroad to success. The most dependable and most profitable use for most of the crop grown in South Africa is to feed it to our own stock, on the farm on which it has been grown. In this way we do not impoverish our land unduly by taking away everything from it and returning nothing to the soil, as is the case where the whole crop is sold off the land.

FEEDING VALUE.

Lucerne is rich in protein elements, which go to form muscle, blood and bone. When fed with maize corn, maize fodder, oat hay, roots and other fat-forming foodstuffs, it makes one of the most valuable rations for all farm stock. In America it is found that the cheapest way to make pork is to allow the pigs to run in the lucerne pasture.

Lucerne may be cut and fed as green forage, made into hay or pastured. It will not stand heavy pasturing, and great care must be used lest the animals get hoven or op-blaas. Cattle and sheep are particularly liable to bloat if pastured on a young growth of lucerne, or while it is wet with dew. Horses and pigs do not seem to be injuriously affected by it. For horses and dairy cows kept in town, a plot of lucerne is one of the most profitable garden and orchard crops. In the orchard it acts as a fertilizer to the fruit trees.

LUCERNE HAY.

Lucerne hay is undoubtedly the most useful form in which this valuable crop can be preserved, and the safest in which it can be fed. But unfortunately it proves one of the most difficult crops to make into hay. Lucerne stalks retain their moisture long after the leaves are dry; in drying, the leaves become so exceedingly brittle that they are easily broken up into a powder in the handling, before the stalks are fit to bale. If, on the other hand, the crop is baled while too damp, the bale becomes mouldy within, and its value is seriously reduced.

Shade drying has given the most satisfactory results, and is adopted by many of the larger growers.

It is impossible to give a hard and fast rule as to the length of time the cut can remain in the field before raking up and carting to the drying shed. This will depend on several factors—cloudiness of the sky, humidity of the atmosphere, weight and succulence of the crop, etc.—and can only be learned by experience.

In many cases it is found desirable to horse-rake the morning-mown swath into windrows the same afternoon: that mown in the

afternoon, the following morning. The windrows may then be raked into cocks in 24 hours, and these carted to the drying shed in another 24 to 36 hours according to the state of the weather. In the drying shed it is allowed to remain from 8 to 10 days or so; if very dry and brittle, a showery or damp morning is selected for baling, when the hay is generally sufficiently flaccid to allow of its being baled without too much loss by breakage.

In America where the crop is mainly fed on the farm it is customary to stack the hay, but in the Transvaal baling is generally practised, as it renders the crop so easily handled for market. When baled there is less danger of injury from the weather, and of loss of crop in feeding, but it is perhaps more difficult to prepare for baling than for the stack. Baled hay only occupies about one-third the space required for stacked hay.

DISEASES AND PESTS.

In the Transvaal our young stands of lucerne are sometimes eaten down by a green caterpillar, the larva of a yellow moth known as *Colia electra*. The Government Entomologist recommends the use of a light brush-harrow or roller to crush the caterpillars.

The lucerne leaf-spot *(Pseudo-peziza medicaginis)* is also abundant, and must have some injurious effect on the crop. By burning off an infected crop while the plants are young, this disease may be greatly reduced and kept in check.

Dodder or love-vine *(Cuscuta)* is a serious parasitic pest, which often causes much loss to growers; fortunately we have but little of it here. It is introduced by means of seeds among the lucerne seed, and when once thoroughly established proves difficult to eradicate. When it is once seen, no time should be lost in burning all infected plants, by which means it may be kept in check.

AS A GREEN-MANURE.

For improving the soil, lucerne is one of the best crops that can be grown, and for this purpose it may be planted in orchards. Like other leguminose crops, it has the power of acquiring nitrogen from the air, by means of bacteria living in symbiotic relationship, on its roots. This nitrogen is then deposited in the soil.

In the Transvaal lucerne fields I have rarely been able to find many bacterial-nodules present on the roots, and often none at all. The largest crop of them which I have seen was in the field of the Hon. J. A. Neser, M.L.A., at Klerksdorp, in a moist, light, sandy loam. On transplanting some of these plants, together with a good deal of the soil surrounding them, to the Botanical Experiment Station, Skinner's Court, Pretoria, the lucerne grew, but the old nodules gradually disappeared, and very few new ones could be found.

Artificial inoculation of soil and seed, with bacterial cultures, has so far failed to produce any effect with us. Our lucerne appears to thrive just as well without the bacteria as it does in other countries with them.

As a rotation crop, for improving the soil, the principal drawback to lucerne is that it takes so long to reach full maturity. In spite of this, it is extensively used in America for this purpose.

SOME CAUSES OF FAILURE AND ESSENTIALS OF SUCCESS.

The following list of "Dont's" is adapted from Professor Coburn's "Book of Alfalfa." and is well worth consideration by intending growers, though we are not prepared to give an unqualified endorsement to some of the items, such as No. 11 :—

1. Don't sow any nurse crop.
2. Don't sow on freshly ploughed land, no matter how carefully prepared.
3. Don't let weeds or grass grow over six inches high without cutting.
4. Don't cut when wet with rain or dew.
5. Don't let lucerne stand if turning yellow; cut it.
6. Don't sow old seed.
7. Don't sow less than 25 lbs. per acre (if broadcasting), one-half each way.
8. Don't sow on land that will not raise 250 bushels of potatoes per acre.
9. Don't sow twenty-five acres at first; sow five.
10. Don't pasture it for the first year, better wait till the third year.
11. Don't put any of the rotten kraal-manure anywhere but on your lucerne plot.
12. Don't use fresh manure.
13. Don't depend on nitrogen bacteria or on inoculated soil from other fields.
14. Don't let water ever stand on it.
15. Don't let it go if the stand is poor and thin, but disc in more seed.
16. Don't be afraid you will kill it by discing or harrowing.
17. Don't re-plough the land; disc it.
18. Don't try to cut for hay until the lucerne takes the field.
19. Don't sow on any land not well underdrained.
20. Don't leave your lands rough; use a roller or a plank float to level and smooth.
21. Don't give up if you don't at first succeed; try again.

An Ohio lucerne farmer, also quoted by Professor Coburn, gives the following additional advice:—

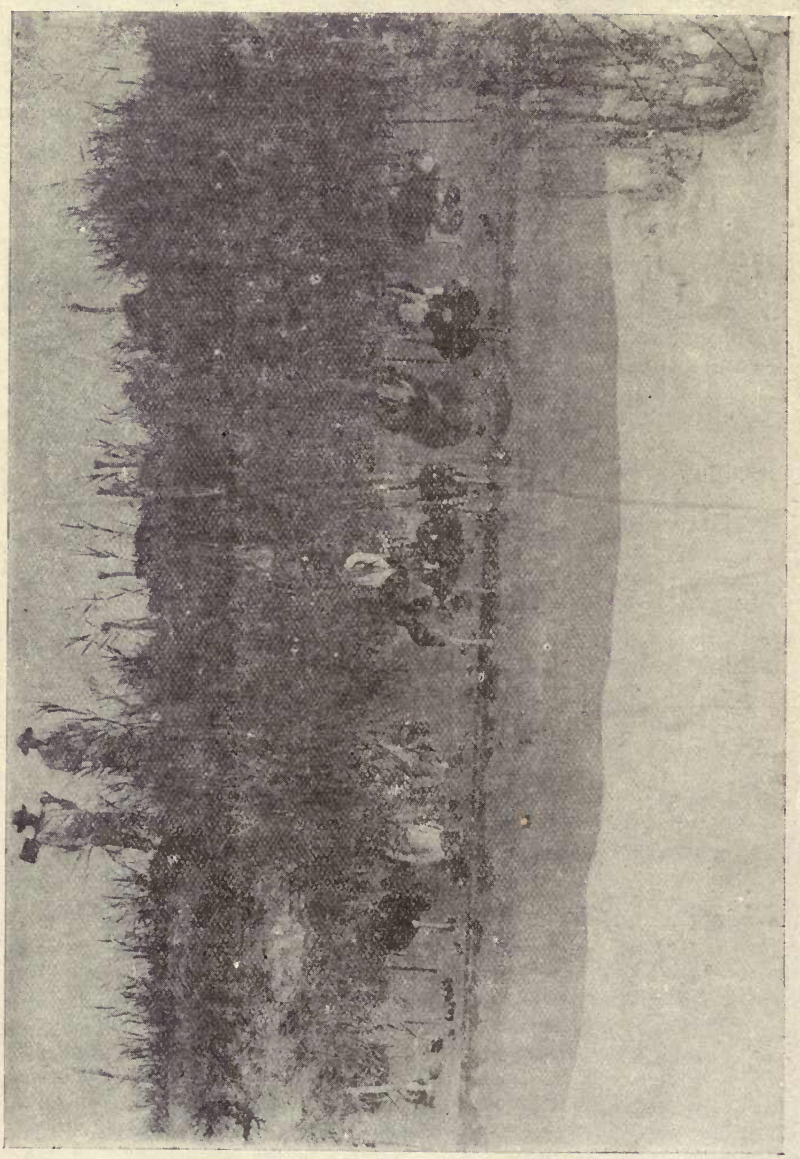
I have known about alfalfa from boyhood; been familiar with it for thirty years, and have grown it successfully on many soils, from a stiff clay, upwards. The failures which I have seen have been accounted for by the non-performance of some of the essentials. There are certain "musts," not "shoulds," to be observed to secure success. Here they are from my experience.

First of all the seed must be pure, of high germinating power, and of the highest possible vitality. If I doubted my own proficiency in these determinations, I would consult the nearest State Experiment Station. I have had occasion to consult Government Experiment Stations, from New Jersey to Wisconsin, on various subjects, and in every instance have met with prompt and valuable —and sympathetic—assistance.

The soil must have lime, either as one of its natural constituents, or lime must be added. If the soil is deficient, then the lime must be incorporated with the soil some months before seeding.

The land must have sufficient drainage, either natural or, as in the case of clay and heavy clay-loams, artificial.

The land must be fertile to a depth of at least nine inches. Beyond that depth the taproot in its search for water will take care of itself.



[Photo by W. Thomas, Esq., Oudtshoorn.]

OSTRICHES GRAZING ON A WELL-GROWN LUCERNE PATCH.

Dodder and its Eradication.

(By DR. ERIC A. NOBBS, Agricultural Assistant.)

Reprinted by permission of the Cape *Agricultural Journal.*

WITH the extension of lucerne cultivation and the increasing demand for seed, more and more is being heard of the danger of dodder and the havoc caused by this pest in our finest and most valuable lands. Many farmers are still ignorant of the appearance of the plague, but they are not likely long to remain in this blissful state, as information is constantly received of its occurrence in fresh localities. Once seen it cannot be mistaken.

For those still unfamiliar with its appearance it may best be described as a tangled mass of thin yellow or brown strands, resembling the tassel of ripening mealie cobs, but spread upon the ground twining round the stems of lucerne or other herbs, bearing dense clusters of white or pinkish flowers possessing a sweet but sickly scent.

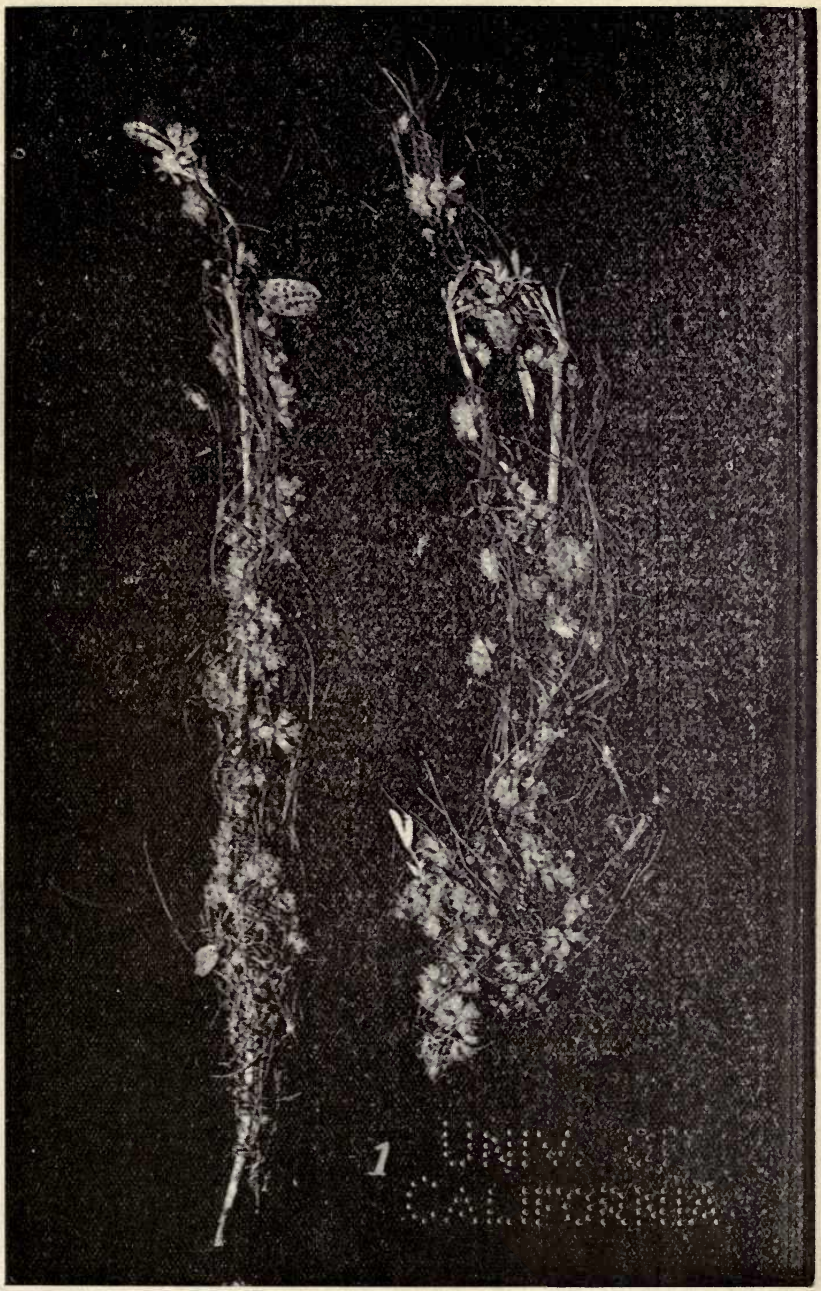
To understand its habits, its simple life history must be known. Supposing the seed to be sown along with lucerne on a new piece of land, it germinates just as do all other seeds, but somewhat more slowly than does the lucerne, a provision whereby the presence of the host is assured when the dodder needs it. Like all other flowering plants, dodder begins by sending down a little root into the ground, but the shoot which springs upward is a single smooth stalk or thread bearing no leaves. The young dodder in its growth gyrates round and round, in the direction opposite to that of the hands of a watch, feeling, as it were, for a lucerne plant to grip. Should none be near, the posterior parts of the stalk die off, and the front portion grows out, thus actually creeping over the ground in search of its prey. On finding a suitable host, the dodder laps itself round the stem, and developes a number of processes, technically *haustoria*, which pierce into the stem and, forming an intimate connection with the vascular system of the green plant, proceed to suck from it the sap, taking sustenance and growing at its host's expense. The root of the dodder disappears at an early stage. The dodder grows rapidly, and sends out branches, which in turn clasp other plants, and so spreads like fire through the crop. The rate of growth, encouraged by all the forces which should go to the nourishment of the crop, is extraordinarily rapid, and any fragment broken off is capable of continued growth provided it reaches a suitable plantion which it can live.

There are some hundred or more different kinds of dodder known to botanists, each of which is parasitic upon a single species or upon a restricted number of plants, but not upon anything indiscriminately. The generic name is *Cuscuta*, and in Europe the commonest species are *C. Europaea*, *C. epilinum* and *C. epithymum*. The last named was first reported in the Cape Colony at Graaff-Reinet in 1895. In America twenty-five species are known, of which, on lucerne, *C. Arvensis* is common in the eastern States, and *C. epithymum* in the west; hence these are to be specially looked for in seed introduced from those quarters.

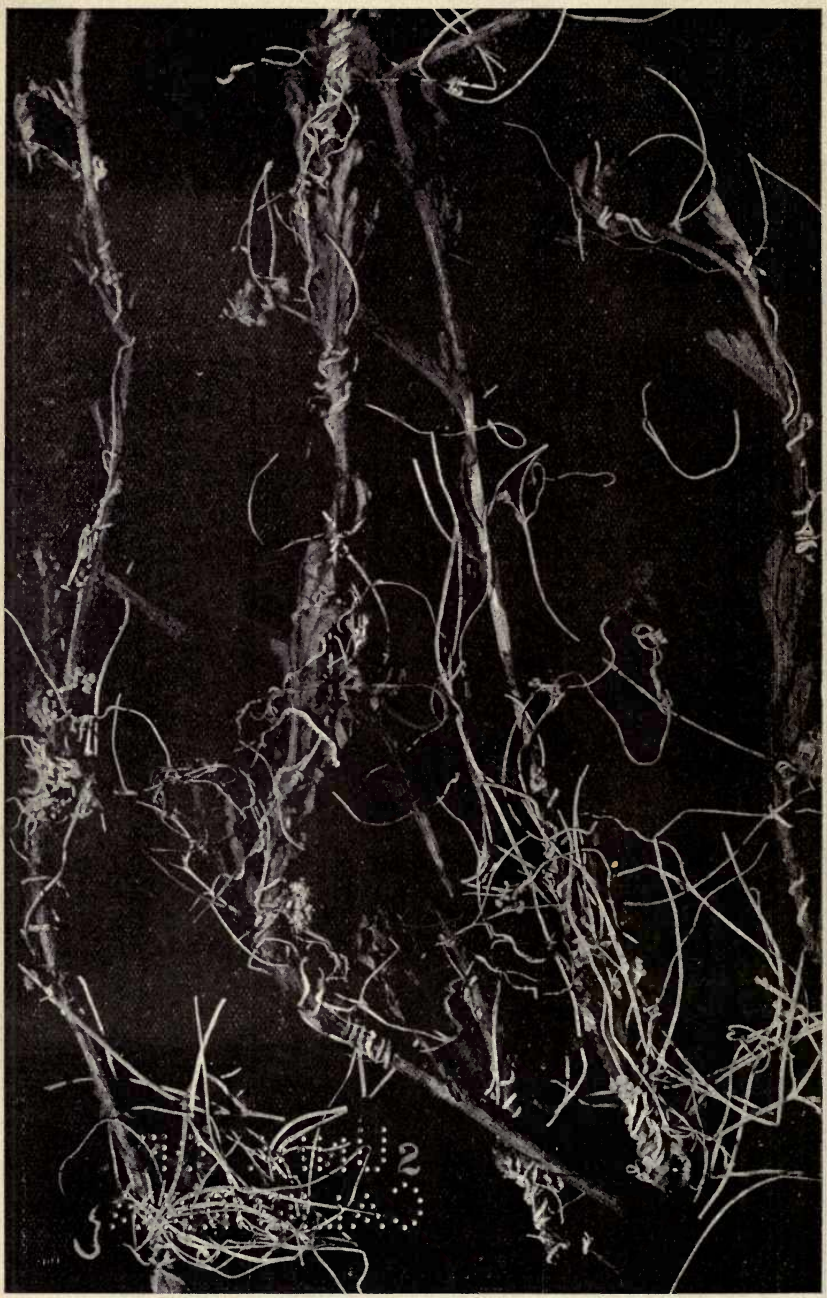
In South Africa there are quite a number of dodders. Those above mentioned have been introduced with seed, and are only too frequently found amongst lucerne. Besides them there are native sorts, such as *C. Africana* and *C. appendiculata*, which occur naturally upon wild bushes in the veld. These often attack lucerne, to which, however, they do not appear to be quite as fatal as are the other varieties. But these two last named possess one characteristic making them more objectionable than the other dodders, the seed is more nearly equal in size to lucerne seed. This renders it impossible to be removed by the recognised process for cleaning lucerne seed, that of passing it over sieves of twenty meshes to the inch, which allows most ordinary dodder to pass through and retains the smallest lucerne seed. It is, therefore, more than ever important to us, especially when buying Colonial seed, to insist upon it, as a reasonable precaution, that the seed was collected from a dodder-free crop and kept free from contamination with dodder in threshing, bagging or elsewhere. No cleaning process is likely to remove these large seeded dodders. Though less harmful than others, these sorts are none the less to be avoided at all costs. These facts render it all the more imperative that dodder whenever found should be destroyed.

The general question of the quality of seed sold, as used throughout the Colony, is receiving much popular attention at the present time. It is coming more and more to be felt that, while it is obviously impracticable to define exactly what is seed fit for sowing and what is not, yet there should be some means of ascertaining readily the quality of any particular sample. Following upon the lines already adopted in foreign countries, it is proposed by legislation to provide facilities for the proper examination of seed leaving it to the individual discretion of vendor and buyer whether to make use of the opportunities provided. Certificates will be issued stating the results of analysis of samples upon which the buyer may depend, and whereby the true value of the seed may be accurately assessed.

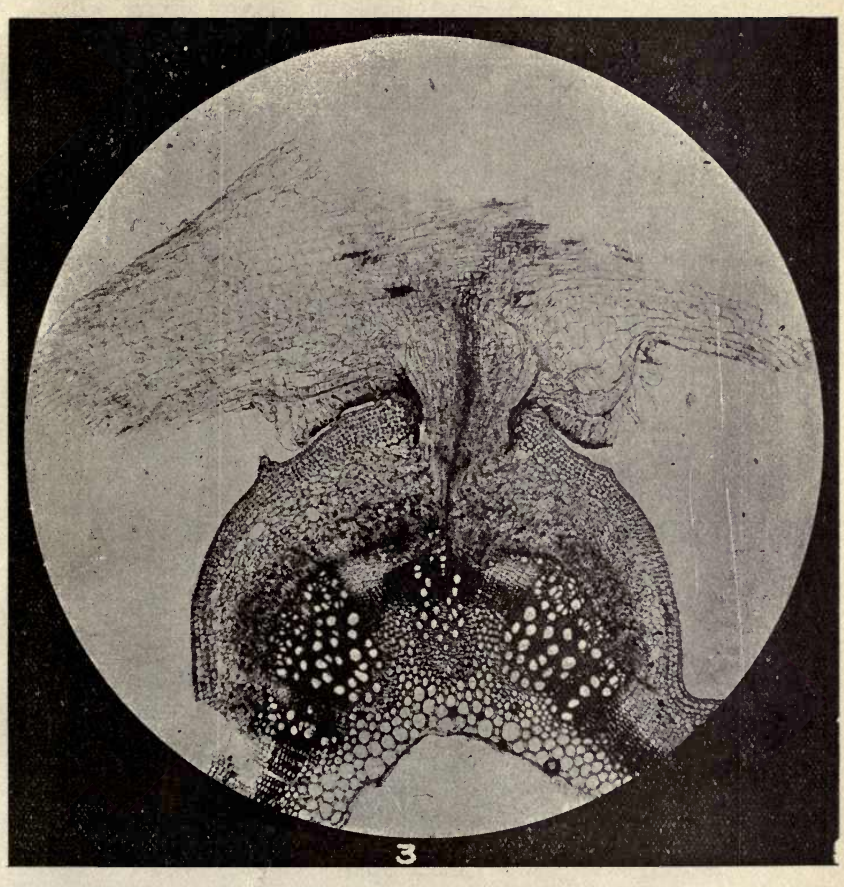
In the particular case of lucerne a special examination for the presence of dodder is requisite. For this purpose a certain arbitrary standard has been adopted by all the leading seed testing laboratories, whereby it is laid down that if a sample properly



Dodder (*Cuscuta Epithymum*, Murr.) on Lucerne.
Note the twining strands and cluster of flowers. Half natural size.



Dodder (*Cuscuta appendiculata*). Half natural size.



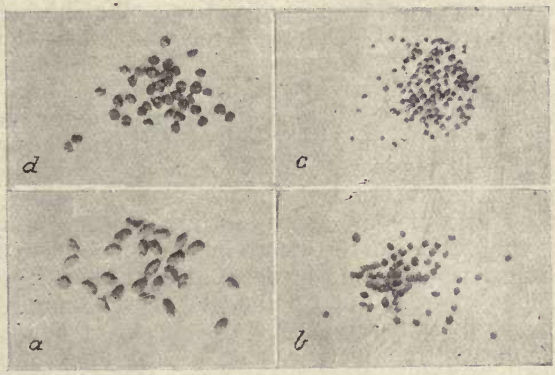
Microscopic section of haustorium of Dodder, showing the sucking organ piercing the stem of the host and its vessels forming an intimate connection with the vascular fibres of the attacked plant. Multiplied thirty diameters.

Lucerne Plant.

UNIV. OF
CALIFORNIA

drawn from bulk and weighing one kilogram (two and one-fifth pounds) is free from dodder then a certificate to the effect that that sample is technically dodder-free may be given. Conceivably, a seed or two of dodder may be yet present in the bulk, but the chances are over 476,000 to 1 against it, as that is the average number of lucerne seeds in a kilogram.

Besides the lurking danger in the seed used, dodder, as stated, occurs on many wild plants in the veld, and is liable to be spread thence to cultivated lands by means of animals, blown seed, or the current of streams. But experience has shown that accidental or natural introduction is much less common than artificial infection, either through seed or from implements brought from foul to clean land through unintentional human agency, irrigation water and the like.



Lucerne and Dodder Seed. Actual size. (*a*) Fair sample of Lucerne, imported. (*b*) *Cuscuta arvensis*, foreign origin. (*c*) *Cuscuta trifolii*, foreign origin. (*d*) *Cuscuta appendiculata*, indigenous.

When small spots of dodder are found either on lucerne or on wild plants they should be taken in hand at once, if possible before flowering. An effective method is to cut the lucerne close to the ground, clearing up the surface and drawing everything from a yard beyond the edge of the affected patch to the centre, and there burn it. If moist or otherwise incombustible, the heap may first be sprinkled with parafin. Under no circumstances should the cut stuff be carried away, as in so doing, fragments are sure to fall, and so disseminate the disease. If in flower there is danger of ripe seed not being burnt. After a week the spots should be carefully examined lest a fragment has escaped destruction and be spreading again.

Another system is to spray the patches after they have been cut and allowed to wither somewhat, with a 10 per cent. solution, 1 lb. to 1 gallon of water, of sulphate of copper (blue vitriol, blue-

stone) or of sulphate of iron (green vitriol, copperas). Wooden utensils should be used, as metal would corrode. Strong brine is also successfully used. These poisons, of course, kill the host plant down to the ground, as well as the parasite, but the lucerne will spring up again. Arsenite of soda, as supplied by Government for the eradication of prickly pear, is also effective when sprayed over the affected patch. A solution of $2\frac{1}{2}$ per cent., 1 lb. to 4 gallons, kills the dodder, but also destroys the lucerne, which must be re-sown after one or two floodings have washed the poison out of the ground.

In the case of a whole patch or field being over-run with dodder, the only procedure to be followed is to graze it down close, plough the land over, and for two years cultivate crops other than lucerne on the land.

But prevention is preferable to cure, and the use of only seed guaranteed free from dodder is imperative. Watchfulness with regard to the presence of dodders on the veld is also an obvious precautionary measure.

The caution and activity of the public in their own interest would no doubt be quickened by the proclamation of dodder as a noxious weed, thus entailing its compulsory removal within a limited time after its discovery. This course has been followed in the Divisions of Oudtshoorn and Cradock, where dodder is now noxious in the eyes of the law, as well as by common consent. The assistance of the public in the enforcement of the Act would be a potent aid in restricting the spread of dodder, and it is to be wished that other districts would follow the above examples.

In conclusion, it is requested that specimens of dodder, both from wild plants and from lucerne, may be sent for identification to the Agricultural Assistant, Capetown, in order that a complete collection of the forms occurring with us may be made, and their relative frequency approximately estimated. There still remains much to learn about dodder.

Other Enemies of Lucerne.

Dealing briefly with this subject in his Prize Essay in the *Midland News*, Mr. F. Franks says :—

Locusts trouble lucerne very little; the brown ones eat a little if they sleep on it, and the red-winged ones eat rather more ; but it seems to disagree with them, much in the same way as it does with cattle (new to it), viz., by blowing them up.

Caterpillars and beetles tackle it a little, eating mostly in patches and sometimes eating all the leaves ; they often destroy very young lucerne put in in October, November and December and the early part of January. The best thing for them and you is to roll them with a heavy roller.

Another method we know to have been tried with success is to cut the lucerne when badly infected with caterpillar and turn it into ensilage.

If the caterpillars are troublesome in small patches of lucerne only, they may be effectively dealt with by spraying. The spraying solution, with which the greatest success has been obtained, consists of Paris Green, at the rate of 1 lb. of Paris Green, and from 150 to 200 gallons of water, with the addition of 2 lbs. of freshly-slaked lime. This mixture is sprayed directly upon the plants, and must be renewed if washed off by rains. These chemicals are very cheap.

MITES.—A correspondent wrote to the *Agricultural Journal* in Sept., 1907, as follows :—

Under separate cover I am sending you a bottle containing a number of very minute insects. This little pest has attacked a patch of about seven morgen of lucerne, and every square inch of ground seems to be alive with them. They suck all the juice out of the leaves and retard the growth. Can you suggest any simple remedy for getting rid of them? Do you think irrigating at short intervals will remedy the evil? !

Mr. C. B. Lounsbury, Government Entomologist, supplied the following memo :—

The specimens were all dead and somewhat decomposed when they reached me, but I am unable to distinguish them from the common Bryobia Mite, *Bryobia pratensis*. Information in regard to this insect as a fruit tree pest was given in the *Agricultural Journal* for August, 1903. We have noticed it in small numbers in lucerne near Capetown, and last year a report of serious injury to a small patch reached us from Steynsburg. In America the creature is called the "Clover Mite," and doubtless it is found there on lucerne, as it is known practically all over the country; lucerne and clover, be it understood, are allied plants. But it is not recorded as a pest of any importance to lucerne, and last year an enquiry to the entomologist of Colorado, in which State lucerne is extensively grown, brought a reply to the effect that it was not known to affect lucerne in his area. The fact is mentioned because, from the Cape experience alone, the creature appears capable of giving a good deal of trouble. That it does not in Colorado is hopeful. The climate of the State is dry, lucerne requiring irrigation always, and dryness seems very favourable to the rapid multiplication of the mite. Though to be found in almost every garden around Capetown, where the climate is a relatively moist one, it never does much injury. It may be inferred from this that irrigation at short intervals, as suggested, will tend to keep down the numbers.

Lucerne as a Factor in Dairy Farming.

By R. SILVA-JONES,

(Late Government Dairy Expert).

THE age of providential trust in the weather, and the all-too-scanty and irregular rainfall of this Colony, is slowly but surely passing away; the lesson is being learnt and realised that we must store what surplus water we get and lead it in the dry seasons, which after all are regular, whilst the wet ones are not. What better confirmation of this lesson can we have than by the result of actual experiment and the dearly bought experience of others who are busily engaged in the cultivation of lucerne to-day.

In New Zealand, statistics show that in a period of ten years the exports of agricultural produce have almost doubled themselves. Ten years ago the figures stood in round numbers at ten millions sterling, but returns just to hand show they have risen to nineteen and three-quarter millions sterling—the major portion of this grand total being brought up from products of the dairy.

I quote this example at the outset to show what can be done by strict attention to detail, and with a set determination to increase the products of the country, and improve their position financially.

From the same report I gather that ten or fifteen years ago New Zealand was in the same undecided condition as to "will it pay" as we are to-day; and although, judging from the current report, there is still room for huge improvement and development, one can still see a determination to ensure that development and general improvement.

Lucerne growing is to be one of the chief elements of that coming development in so far as the future of the Cape Colony is concerned, and this article will be limited to that development and improvement in so far as the dairy industry is concerned only.

Firstly, I may say, to touch upon the salient points, it enables a larger number of cows to be kept on any given area than previously; secondly, the feeding of milch cows—I am assuming

lucerne to be the principal and most economical of cow feed—gives one not only a better condition and a more healthy condition, but it gives one the absolute control of the calving period, which is in itself of inestimable value to the dairy farmer, besides which a herd of cows trusting to the veld for sustenance will not breed and increase regularly during time of adversity and drought; on the other hand again cows fed reasonably and the food put before them in a proper way will thrive year in and year out, increase quicker, and give a more handsome return, which will permit of dairy industries creeping up in our midst to the benefit of the producer, the creamery and the public. At present it is not to our credit that in a lovely cattle country like ours we are only able to support the barest minimum of creameries, and those working to excess for a short period, and practically more or less closed down for the remainder of the year.

Lucerne of all crops gives the heaviest yield, and can be had to feed in the fresh green state for many months of the year, and when once thoroughly established defies to a certain degree the periodical droughts of shorter duration, and is therefore a certainty to the dairyman; and if one point is essential more than another to the milk producer it is regularity in food supply for his milch cows. It cannot be gainsaid on this most important score that any economical food can approach lucerne. Besides the extraordinarily heavy crops in a fresh green state, the farmer can save his surplus in the form of

HAY AND SILAGE,

each of which form of fodder has its own special merit. Whilst touching on this side of the question, it might be well to counsel all milk producers to most thoroughly thrash out and argue the merits and demerits of this form of winter feeding. I myself advocate it to the utmost as a milk producer, but yet on the other hand knowledge and care are essential in using it, as there is a possibility of trouble ensuing by careless use. Lucerne, in the form of hay, is excellent as a life-sustaining and fattening food, but it is not a food that tends towards a heavy secretion of milk, while green lucerne and ensilage, being a food of a highly nitrogenous nature, requires a slight admixture of a carboydrate to balance the whole food to prevent waste through the excess of one food constituent over another. To balance this excess, I cannot recommend a better admixture than crushed mealies; they are, I think, the most economical to the farmer.

Lucerne as a factor to dairying has a most far-reaching and in every sense beneficial influence upon regular milk production. If the milk supply were heavier, more regular and more certain, it would afford great stimulus to co-operative dairying. It is not that we have not the cattle in the country sufficient to create and support these industries, but that they have been bred, speaking

generally, with quite another object in view—transport—and their value as a producer of milk quite lost sight of. But now that the days of transport are practically over, attention must be given to deriving income from our cattle through a different channel—the dairy—and it is not the work of a day or a year to transform our cattle into good dairy stock; it must come gradually, by careful selection and culling, together with good feeding and improved treatment.

I make bold to say that we have in this Colony a most excellent foundation in our present stock from which to build up, by selection and weeding out, a really good, profitable and creditable dairy cow, in a shorter space of time than people imagine.

It may be argued as to why lucerne should be such an important factor to dairying as to be the cause of such a revolution amongst the cattle of the country, and perhaps the question might be a little difficult to solve if it were not that the wishes and inclinations of cattle owners are towards improvement in their general herds, and increased milk production from their cows, more early maturity in their bullocks, and more economical method of manipulating and disposing of their product, and with such an asset in hand it is more or less an easy matter to show how lucerne, the chief of cattle foods, becomes such a mighty factor.

MANAGEMENT OF COWS.

To commence with, to feed properly requires accommodation in the form of some style of shelter, or stalls fitted with mangers in which to feed, and the bare fact of providing shelter for cattle when it is required is of itself a great advantage and a step in the right direction. It is estimated by those in a position to make such a statement that in the case of a cow of about 1,000 lbs. live weight, of every 100 lbs. of food eaten, 60 lbs. are required to maintain the heat of the body, to replace wasted energy and tissue, leaving 40 lbs. for the production of meat and milk. Extremes of cold and exposure to rain naturally call for a greater supply to maintain the heat and energy of the body, which means that the reserve, so to speak, for the manufacture of meat and milk is at once called upon, and little or nothing is left for the making of any products from which the farmer reaps profit. This is especially the case during the winter when food is scarce, and looked at in this light, it is really wonderful that so many cattle survive what they have to pass through, to say nothing of yielding any profit to the owner.

IMPORTANCE OF SHELTER.

It is only shelter from the cold rain and biting winds which will obviate this and prevent the natural tendency of reduction of temperature in the body of the animal and increased call on the

margin of food supply, which ought to go to the making of milk and meat. To feed milch cows, in any part of the country where the variations of temperature are extreme during the year, without the requisite shelter and stalling is to my mind false economy, and creates a huge waste of food stuffs. But, at the same time, remember that stabling or sheltering can easily be overdone at the expense of the constitution of the beast, and therefore they should only be stalled when absolutely necessary; one does not wish to make cattle too susceptible to any sudden change of weather.

Thus it will be seen that sheltering is an advantage, from an economical point of view of food, from increased milk supply, and from a point none the less valuable, that of much closer observation; every time they come in to be milked they are tied up and come much closer under personal attention than otherwise. If a cow is a little off-colour when brought in and tied up, and she refuses food or eats sparingly, it is probable that an approaching illness can be obviated, where under other circumstances it would not have been observed till the cow was actually showing more acute symptoms of the sickness itself.

Cows, to give a maximum return, must be looked upon as delicate pieces of machinery and treated accordingly, and each individual cow should be treated and fed in accordance with her own peculiarities. Can this be done otherwise than by feeding and housing? The cows become quieter and more docile when stall-fed daily, which all tends to greater, more even and regular milk production.

BREEDING FOR THE DAIRY.

Then comes the greater and deeper question of selection and the culling out of cows giving inferior and non-paying results to make room for cows that will recompense the owner for the attention and feed bestowed. In most kraals, now-a-days, you find that out of a certain number of cattle the return for the dairy is made out of the few cows; the remainder are not only a loss individually, but help to eat up the profit made by the few. This is a condition of things that cannot be tolerated, if the dairy industry is to go forward and take the place it ought to amongst the chief assets of the Colony. Weeding out the inferior stock can only be satisfactorily done, and an average of value struck with any degree of certainty, when the cows are kept in a thrifty condition all the year round. It entails a certain amount of labour and time, but repays for it tenfold in a very short time. Weighing the amount of milk given at each meal, and making periodical tests for butter fat with the Babcock tester, is the only way to define the actual value of a cow as a dairy cow. Varying conditions throughout the herd make the attempt to arrive at any definite value of the cow as a factor in dairying quite useless and futile, unless the herd is kept in a thrifty condition—I do not mean fat, as that is the other extreme—

it is only then that a series of tests really and actually becomes of any intrinsic value. Without such conditions prevailing, one runs the serious risk of weeding or culling out cows by their performance at the pail or test, when in reality had the cows an opportunity to assert their value as dairy cows they would often not only be retained in the herd, but would be kept and looked upon as the prizes of the herd.

VALUE OF GOOD FEEDING.

Experience has shown there is the possibility, in fact the probability (especially in heavy milkers), that when cows have once been reduced to a poor, almost starving condition, the milk glands become inactive and the blood exceedingly poor, and the animal never, in so far as milk production is concerned, recovers herself; that although to all outward appearances she may have recovered from the ordeal, her milk yield will never return, the milk glands having suffered to that extent that nature cannot repair the damage done.

At every turn one sees fresh proof the value of maintaining milk cows and breeding cattle in an even, thriving, healthy condition, and that it is only necessary for them to have sets-back to reduce them from the profit to the loss side by events that man cannot always control, such as occasional sickness, without our aiding the process as at present by want of attention, feeding and shelter.

When a cow is in full milk her nervous system is working at high tension and requires help, shelter and food to prevent a breakdown; with it she will continue to work as a machine converting food into milk and meat to the profit of her owner and as an asset to the country at large.

Is it reasonable to expect that a cow at the commencement of the winter season in a low and miserable condition, carrying a calf which has also to be fed and nourished until it is dropped, will do well in early spring? Why, the winter is almost on her again before her system is sufficiently nourished to be able to give any yield of milk at all. It is at the early spring, after the winter is over, that the cows are required to be in the pink of a milking condition to be ready when the grass shoots with her utmost yield of milk. Cows farmed under these conditions are the ones that will yield the profit.

One too often hears a farmer say that he keeps his cows to feed him and his family, and that they must do the best they can under the prevailing conditions, but if the cows he keeps enjoyed only a tithe of the comfort that the owner enjoyed, how much better would that cow be able to support the farmer and his family.

While on this point, a subject well worth mentioning is the provision of shelter by clusters of trees in the centre of the camps or paddocks, to help the cattle to be better able to protect them-

selves at their leisure from the sun's rays, or the sudden change to cold which one gets in the Colony practically from one year's end to another. Under prevailing conditions the sole shelter that a cow can get either from the sun, the rain or the wind is a six or seven-wired barb fence!

These few ideas indicate but a tithe of the benefits to be derived from the proper and reasonable feeding of breeding cattle, which causes lucerne to be such a factor in dairying, and it behoves all those who possibly can to lay down lucerne lands. Not all can do it; the hilly condition of the land and the soil formation may be adverse, but to them other crops are available. Lucerne in a country like this can never be a glut in the market, for if the market is glutted for direct sale, the feeding of a farmer's own stock and the indirect profit thereby derived is always open to him. I believe, in fact I am sure, the indirect profit is greater and far more beneficial in the long run than that derived from the direct sale. Of course it takes greater time to realise, but to balance all this your stock reaches maturity earlier, and the manure obtained by this system of farming is of no little value and importance, when by this practice the farmer, while cropping his acres, can greatly improve his soil value

I would like to see lucerne planted on every available piece of ground possible, whether under irrigation or not. Naturally the crops are heavier under irrigation, but even without it, given reasonable cultivation, good crops can be assured even in dry weather.

The changes that will arise from the extensive use of lucerne by the dairy farmer of this Colony have in a very detailed way been shown to be unbounded, and the beneficial results that will arise to the milk producer and the Colony at large as a producing state must be enormous. When this development and improvement have taken place and the raw article is produced very greatly in excess of the present, then will be the time for co-operative advancement. I ask you does it appear reasonable on the face of it to sell off one's crops while one's own stock is withering away for the want of proper sustenance?

Feeding Lucerne to Stock.

IN addition to the value of feeding lucerne to ostriches, which is exhaustively dealt with in the opening article, experience shows the king of fodder plants may be fed to almost any stock with advantage. Following is the experience of Mr. F. Franks, contained in his Prize Essay which we published a few years ago:—

CATTLE.

Oxen will fatten in from 13 to 16 weeks if grazed on lucerne, and in a much shorter time if fed on lucerne in stalls; this of course is owing to their taking less exercise; but there are many drawbacks to feeding in stalls. First, the expense of erecting them; another is the worrying of flies, and another the expense of the attendant, as they take a great deal of attention.

The best way of fattening oxen is in connection with other stock, such as birds. The oxen are put on after the birds, so it depends upon what the birds are allowed to leave, how many oxen can be fattened on the morgen.

Great care must be taken when putting oxen or cows on lucerne (or on a fresh piece) for the first time. They should not be allowed to stay for more than 20 minutes at a time, and if they have never been on lucerne before, they should not be put in hungry. As a rule, if they have never seen it before they will not eat large quantities the first time. In all cases they want careful watching, and the trocar always handy.

To show how much risk there is, Mr. Probart, of Graaff-Reinet, told me that some of his milch cows had as many as three holes in them, and hardly a single one's skin was whole or without hole.

Dairy farming pays well on lucerne; the milk is perhaps lower in quantity than when fed on meadow grass or barley (green), but the quality is superior. The above remarks as to stall feeding and loose apply equally here.

100 morgen of lucerne should keep 100 cows with the other stock.

It is much more economical to keep the cows out of the lucerne and feed them in the kraal in mangers; the lucerne has only to be mowed and ridden on, it should not be chaffed, as they

will then eat too quickly. When starting, give mostly lucerne hay and very little green lucerne; when they are quite accustomed to the green lucerne, a good ration for milk is three parts green and one part hay; when dry reverse this. Large calves should have half-and-half.

HORSES AND MULES.

If not wanted for fast work lucerne hay is a splendid feed alone, but if they do fast work a little grain should also be given. Yearlings and two-year-olds thrive better on lucerne fields, with at night and morning a little hay, than on anything else; of course the latter when not in work.

It is the cheapest food that can be bought (grown in this country), as none of it is wasted like forage, half of which is generally under the manger.

SHEEP.

Thirty miles from the coast sheep fatten and do well on lucerne, but nearer than this lucerne farmers are bothered with gall sickness, which when the sheep are feeding on lucerne is very virulent.

They fatten in from six weeks to two months, and scale up to 75 lbs. The same care must be taken with them as with cattle as they are very prone to hove, and in their case the trocar is very dangerous.

Sheep are fattened in connection with birds and cattle, and we often put on after harvesting and before watering.

Breeding pedigree sheep would, I should think, pay well on lucerne, as they would grow to perfection.

PIGS.

I have fed pigs in a sty on lucerne alone, and I cannot say they do well.

In America they go in for fattening pigs, running on the lucerne. They put from 10 to 15 pigs on an acre for six months, in which time (weighing 400 lbs.), when put on, they gain another 100 lbs. each. 1,000 lbs. of pork are worth there 50 dollars or £10 8s. 4d.

POULTRY.

Fowls and turkeys on a fairly large scale fattened on lucerne will be found to pay and do handsomely, fattening very quickly, and a large number can be fattened on a comparatively small piece.

At night they roost in a galvanised iron house on wheels with broad tyres, and a pair of shafts or a pole for the horse or two mules to move house and poultry to pastures new The house should be moved when the poultry have retired for the night and before they settle on the perches.

The house must be kept perfectly clean to guard against disease. The best way to do this is to thoroughly clean it every morning, and to syringe the inside with strong dip and water.

The poultry should be moved at least once a week. A little trouble will be experienced at first in getting the birds into the house, but when once taught no trouble will be experienced with the new arrivals.

Ducks and geese eat more that they are worth.

Breeding thoroughbred fowls on lucerne is expensive. For this it would be necessary to keep a piece of lucerne (say ten morgen) for this purpose alone.

This would have to be divided into wire-netting camps for the separate lots and breeds, and in some cases netted overhead, each camp to be not less than a quarter of an acre, or 30 yards by 40 yards.

Light moveable houses should be made, and only half the camps used at one time. The land should be laid out and used in such a way that camps not in use can be watered in one piece, so as not to risk flooding camps in use.

Lucerne Hay.

(By R. RICHARLS, Fayville.)

THE chief object in writing these notes is to give growers of lucerne some idea of the difference between lucerne *hay* and dried lucerne, in order that they may appreciate the difference in the quality, which is very essential.

It is universally admitted that lucerne is the most valuable food we have for horses, sheep, cattle, ostriches, etc., but if we are to take full advantage of the fact, we must be able to store quantities of this valuable fodder as an insurance against the terrible periods of drought by which this country is afflicted. In a word, we must convert our surplus lucerne into *hay*, and not merely into dried lucerne, which deteriorates by keeping. I wish to distinguish very clearly between the two articles. There has been, and indeed still is, a confusion of terms; the word "hay" as applied to dry lucerne is a misnomer. Properly cured hay does not deteriorate with keeping; the dried article does. When growers become better acquainted with the former, they will prefer it to the latter. It has come to stay, and is destined to make sheep farming a success even during the most severe dry spells. Lucerne is of more value to the country than all the diamond mines, in that it becomes the personal asset of the man who plants it; he reaps the immediate advantage, and when this is multiplied throughout the whole agricultural community, the State benefits by the general prosperity. Besides, what a pleasure it is to a man to be able to feed his stock during drought. The farmer who can do this must, of course, store his surplus instead of selling it for the sake of turning over the money at the moment.

HOW TO MAKE HAY.

To make lucerne hay, cut when the flowers appear; it should not have too much flower, for as the plants go up into flower the stalks get hard and thick, and the leaves fall off at the bottom. To get good hay you must have all the leaf, and if cut too old, lucerne will not make good hay.

If cut in summer it must be left one day before raking, and then rake while there is a little dew, this keeps the leaf on. Then put it into pooks or cocks of about four feet wide at the bottom, and build up cone shape with forks. Usually it should be left about four days to dry, according to the weather, before stacking. If your fields are sown in sections, then make your pooks on the ridges between the sections; this mode keeps the sections clear.

When pooking, work your lucerne—say the outside ridge to the second one, then half of the second section lucerne to the same ridge, and the other half to the third ridge; then from the fourth to the third ridge again. This brings the two rows of pooks on the two ridges of one section; this saves a lot of tramping to your lucerne when carting to stack, and keeps the traffic on one section. Change about your pooking every cutting from one section to another.

CARTING TO THE STACK.

When carting to the stack, first see that the lucerne is in the right condition. To know this, open the pook to the centre, then take a few stalks in your hand, pass between your finger and thumb, and see that the skin does not rub off; if it rubs off it is not yet ready to stack. Should the ground be very wet, and the pooks be damp at the bottom, then turn them over for a couple of hours in the sun before riding in.

STACKING.

Say for a stack eighteen feet by thirty, first make your "steddle" eighteen by thirty, of wood or stone, to keep the hay from coming in contact with the ground. Next make a flue nine inches square from one side to the centre of the steddle; then take four pieces of wood (say two inches by two and fifteen feet long, or according to the height required of stack), and nail to them small raps about nine inches long and nine inches apart, thus making a flue or ventilating shaft to go up the centre of the stack, connected with the end of the bottom flue. This is a measure of safety against over-heating.

To start your stack commence in the centre by the upright flue, placing say six feet of hay around the flue at the centre, sloping gradually to the sides. This will draw any heat to the centre flue. Always keep your stack high in the centre; this will keep the rain from penetrating. The flue must always be kept shut at the top to make good hay, only to be opened in case of stack overheating.

To test a stack take an iron rod ten feet long, half-an-inch thick, made with a sharp flat point at one end, with a bow handle. Thrust this rod into the stack, about six feet from the centre flue and about six feet high, leaving it overnight; in the morning this will give you the temperature. It will also give you the control of

your stack, and save you from colouring the hay too dark. Good hay must be light chocolate in colour, with a good odour.

The proper time for sweating hay in a stack of the dimensions given should be two months. This is to bring it to hay. By leaving it longer it still improves up to six months.

Hay stacked and sweated as recommended above may safely be pressed into bales 3 feet by 16 inches to any weight required for export, or for packing away in stores. This class of hay will keep perfectly sweet and good for years.

Following are the results of lucerne only one month in the stack, and then pressed into bales of five different weights :—First bale 80 lbs., second bale 90 lbs., third bale 100 lbs, fourth bale 120 lbs., fifth bale 130 lbs. The first two bales did not get mouldy, but did not have the odour of good hay; the third bale smelt tainted; the fourth and fifth bales were both musty after they had been pressed nine days; the size of bales was 3 feet by 16 inches. Lucerne sweated to this stage should not be pressed into bales over 75 lbs.

Following was the result of lucerne unsweated, pressed and packed away under sail for ten days almost air-tight :—Bales averaging 100 lbs. (size of bales 3 feet by 16 inches), then exposed for one week. On opening them found from the end to six inches in it looked green and fresh, but when opened to the centre it was mouldy. This trial was made in view of export. The above trials show that that hay must be *thoroughly cured* to be safe for export.

HAY AS FEED.

For feeding horses, we find that horses work much better on sweated hay. They eat it very freely, there is no waste, and they thrive much better and do with less water.

For feeding cows in milk, dried unsweated lucerne is almost preferable for making butter; it answers almost to green fodder. It should be cut a little younger for cows than for horses; if baled it should not be pressed heavier than 70 lbs. Calves thrive on sweated hay if not cut too old. In no case must it be made wet before feeding either for cows or calves, or the result might prove serious, as wetting creates gas and blows up the animal. Should any animal blow up, put a piece of chain about six links to form a bit and fasten it on to a halter; put it into the animal's mouth; this will keep the mouth sufficiently open to let the gas escape. A piece of ordinary trek chain will do.

DRIED LUCERNE FOR OSTRICHES.

This must be cut just before it comes into flower; this will give you soft leafy fodder. When dried it will shrink very much. It should be rather dry before putting into stack. Cutting out of stack to feed birds, it should be cut up with chaff-cutter and put

into feeding troughs, sprinkling with water. According to my knowledge, one morgen of lucerne by cutting will feed as many birds as two morgen, with birds running on it as they tramp and pick out all the young buds. Of course this means an extra run for birds and a little labour for cutting up, but it pays.

Unfermented Hay.

(By HERBERT COLLETT.)

Following is an extract from a paper on the subject read by Mr. Herbert Collett to the Cradock Farmers' Association on October 4th, 1907 :—

Hay-making should begin in October if the fields have been watered after the winter. As a rule we wait for the buds to form and just a few flowers to appear before mowing ; don't wait longer, as the hay will grow coarse and stalky, especially if the field is at all thin. The first crop of the season is an exception to the rule ; don't wait for it to bud or flower, but cut when high enough, or you will lose a lot of time, for owing to the cold nights in September it takes longer to flower, and the straw gets hard and stalky. This first crop will not be so heavy as the next three during the hot summer months, and the next two again during the autumn and nearing winter will be light. These two crops, the last in particular, do not flower, but make excellent and saleable hay, being very leafy and soft.

For selling make *green coloured* hay, as it commands the best price and is safer to make if you let it get thoroughly dry, and ride it on to stack while damp with dew in the morning, taking care not to have too much dew on a cloudy morning, or on the other hand, if no dew do not touch the hay until there is or you will lose all the leaf.

In *hot weather* it is safe to rake into wind-rows the second day after mowing, and in the afternoon of the third day examine the straw or stalk, which should be quite dry before the dew gets on it, and ride it on to stack early on the fourth morning. If the straw is still damp on the afternoon of the third day it will be too wet next morning to ride on, rather give it another day.

Just before riding on to stack *rake* the rows into small cocks, this saves labour and the dew gets well mixed with the hay. Good green hay has lately been selling at 4s to 4s. 3d. per 100 lbs. free on rail, or 6s. to 6s. 6d. on the Johannesburg market, which is equal to 4s. and 4s. 6d. here.

A fair average to expect from your fields would be about one ton to the acre per cutting, when the fields are well established. Some fields often get grassy in the rainy season, and this mixed.

hay is not saleable, so it is best to keep it separate or at one end of the stack, it will be useful feeding for your cows and horses when the best hay is sold. It is a saving of labour to allow the cows and horses to feed at the stack, and economy to allow the ostriches to pick up the leaves round the stack when the cattle are taken away.

It is also convenient to arrange your stacks in such a position as to allow stock from your different veld camps to have access to them when required, and for ostriches I find it is a good plan to slice off all round the stack with a sharp spade. This method of feeding leaves very little waste, as the stuff falls immediately round the stack and cannot be tramped upon. This I find better than chaffing the hay in the machine and throwing it out into the dust.

More Good Tips.

(By R. A. HOCKLY.)

We extract the following from a thoughtful paper dealing with the whole subject of lucerne growing, read by Mr. R. A. Hockly before the Fort Beaufort Farmers' Association. Mr. Hockly tells us the double watering of ground before sowing is a good tip, giving the young plant a splendid start without the necessity of watering until it is better able to stand the hardening of the surface soil which so often follows. Mr. Hockly grows a good stretch of lucerne and has had much experience. We make the following extracts :—

Don't spare any trouble in levelling the ground and in working it up into good order, by thorough ploughing and cultivating beforehand. I have found that a good plan is, after you have levelled your ground sufficiently, to plough it thoroughly well after a good rain or watering; then leave it for about a week to let the surface ground dry out a little, then water it again, and as soon as ever the ground can bear the weight of the oxen, go over it with a spring-tooth harrow until it is all nicely worked up, then follow with zig-zag harrow until fine enough for the seed ; then sow your seed at the rate of about 20 lbs. to the acre, harrow again twice over, to be followed by a light roller generally the next day, so as to let the ground get a little dry on top, otherwise the roller presses the wet ground down too tight, giving it a crinkly appearance, which on drying out gets very hard and bad for the fine seed to come through. By this method you get your seed sown under very favourable conditions, as the subsoil, with the two waterings, is mud wet underneath, and will supply moisture to the young tender plants for a considerable time ; this is a great advantage, as it is a set-back to have to water very young lucerne, the ground gets hard set and the plants suffer.

Granted that you have a water supply, I would advocate sowing in the latter part of the winter, when the moisture in the ground from the two waterings should keep the plants going until such time as the spring rains are due. The weeds are of course worse than in the autumn, but this need not bother anyone; the main thing is to get the lucerne up well, the weeds can be kept down by running the mower over the field whenever they threaten to choke the lucerne, which will eventually oust the weeds altogether.

A young field should be carefully treated, grazing it very sparingly until it is well and strongly rooted. Many a good field has been ruined by running stock on it too freely during its first season. It is better to run 100 ostriches on a field for a week than to put 50 on it for a fortnight. Remember that it is a crop not living for just one season or two, so that it is worth while giving it the best treatment.

The best time to mow the crop is just when the blossom buds are full and odd flowers showing here and there in the field. As a general rule what you mow down to-day would be fit to rake to-morrow and put into cocks the next day, the thickness of the crop and weather being taken into consideration. When raked the stuff should be tough to the feel and before the leaf makes any outcry in the hand.

The hay cocks should be well put up and combed out nicely so as to allow the water to run off in case of rain, and not made too small. Allow these to stand about four days on the land before riding into shed or stack, leaving it there four weeks before baling. Stacks should be at once thatched with grass, which will keep the lucerne nice and bright. The long sweet grass, of which we had such a quantity last year, makes excellent thatching material.

Hay-making under normal conditions is a fairly easy matter, but it is when you have blistering hot days, and again at others frequent thunderstorms and muggy weather following, it is then that it is all one knows to turn out good, sweet hay. If the stuff is too damp to put up in the early morning, a good plan is to gather it together making it more convenient to pack up quickly when sufficiently dry.

A good test in deciding as to whether stuff is fit to cock or not is to feel the weight of the hay on your pitchfork. This will indicate to you if fit or not almost better than the feel of it to the hand.

In packing cocks on to wet ground they can with advantage be shifted on to another spot after say two days, which will give them a chance to dry out. This is quickly done with three or four men shifting each in turn by putting the forks underneath and lifting them bodily to another spot. It is surprising how very wet the ground becomes under the cocks when perhaps it looked dry enough when they were put up. It is better to put up hay into cocks if rain is threatening even if not quite fit, and then open

them up again when the weather is clear, in this way often saving a crop from getting wet.

In stacking the hay ought to be springy, so that a man standing on the stack ought to be able to make it shake down to the ground; that is always a safe sign. Another way of testing your stack is to drive a hay fork into it, leave it for 20 minutes, then draw it out and rapidly pass your hand along the handle, which ought to be smooth and slippery even if warm, but if it feels sticky then your stack is heating and likely will have to be clawed to pieces again.

Lucerne gives first-class feeding for ostriches and horses, dairy cows give a good and rich supply of milk when fed on it, and small stock all thrive on it. A lamb a month old running on lucerne will manage without a mother, and grow up without that stunted look that the Australians call poddies.

There is no better feed for a beast in low condition than lucerne hay. To feed very poor cattle on oathay does little good; I think that their digestive organs are so weakened from want, that they are unable to derive the benefit from the hard, dry food, whereas with a soft food like lucerne they are better able to digest it.

To Fatten Sheep and Goats.

Following is the experience of Mr. W. E. Murray, of Graaff-Reinet, on how to fatten sheep and goats on lucerne :—

First give the animals a teaspoonful of Cooper's dip and salt (1 of Cooper's dip to 10 of ground salt). Put them into a field when full and leave them there till sold. It is fatal to kraal them at night; they must never get hungry, if so they eat too fast and blow.

There is nothing to touch green or dry hay for ostriches. The leaves can be put in bales and saved for ostrich chicks.

If hot water is poured on the leaves after adding a little bran or mealie meal, it is splendid food for pigs and fowls.

Lucerne hay can be chopped to feed ostriches when it is dry and they require feeding. It can be chopped for horses but not for cattle. Feed the cattle from the stack; if chopped they just swallow without chewing, which is apt to cause a stoppage in the intestines, resulting in death. There is no doubt lucerne hay produces good, rich milk, and dairymen will be well rewarded by using it.

If one has plenty of water, lucerne can be mowed five times a year, then there will be good feeding for the winter, so that ten acres of lucerne is equal to fifty acres of other stuff. What is more, locusts do not care for it and will leave it to the last.

The Trade in Lucerne.

Census Statistics.

Unfortunately there are practically no statistics available as to the rapid development of the lucerne growing industry.

When we were preparing the first edition of this work we elicited a promise from the Government that provision would be made in the next census for the collection of statistics regarding lucerne. The only statistics obtained in 1904, however, were of the "bundles" of lucerne, and of course this item is of very little practical value. The returns given were, for

The Colony proper	14,097,271
Native Territories	16,358
Bechuanaland	8,900
Total bundles grown...	14,222,529

The Director of the 1904 Census observed :—

"A comparison of the produce returns for 1904 with those for 1891 reveals some remarkable changes in the quantities returned in Sections I. and II. under the different heads. Thus wheat shows a drop from 909,163 muids to 561,102 muids; the return of tobacco is less by one-half, and Kafir corn, rye, pumpkins and mangolds all show a decline. On the other hand, more oats, oathay, potatoes, onions and clover are produced than in 1891, and the extent to which lucerne has grown in popular favour is indicated by an enormous increase in the amount produced.

"More than one-third of the lucerne of the Colony and nearly one-fourth of the tobacco is grown in Oudtshoorn, the figures being, tobacco 1,214,324 lbs., lucerne 5,839,320 bundles. It will be seen that the decrease in the mangold and beet produced is much more than balanced by the increase in lucerne and clover."

We extract the following figures from the 1904 Census Returns and give them for what they are worth, not because we think them at all reliable, for some of our largest growers would find it difficult to calculate how many bundles of lucerne they cut in a year, and even if that were possible it would only be a partial indication of the value of the crop, as it would take no account of

the lucerne fed off by stock. However, the districts reported as growing over a quarter of a million bundles of lucerne in the previous year were as under:—

	Bundles.
Oudtshoorn	5,839,320
Ladismith	1,212,005
Middelburg	891,182
Robertson	768,900
Graaff-Reinet	730,500
Cradock	528,820
Uitenhage	453,434
Bedford	338,655
Queenstown	268,067
Hanover	258,250

The total for the Native Territories was as under:—

	Bundles.
East Griqualand...	13,110
Tembuland	1,148
Transkei	1,930
Walfish Bay...	—
Pondoland	170
Bechuanaland	8,900

A further indication of the increase in lucerne cultivation is found in the comparative returns of hay presses, of which the whole Colony appeared to possess 44 in 1891, and 893 in 1904.

Although lucerne has been grown in South Africa for half a century or more, it has only recently become an important article of commerce. For a couple of generations farmers and townsmen kept patches of lucerne for green food for cows and horses, and as such it was sold on the morning markets, but there was no trade in lucerne hay. During the last few years, however, storekeepers have come to stock baled lucerne hay more extensively than they formerly stocked oathay, because it is more conveniently handled and is not as much bothered by mice, etc. Many farmers, too, have done remarkably well in supplying the military, some happy growers' cheques for a single contract running over four figures.

DECLINE OF IMPORTS.

South Africa appears to be developing its agricultural resources fairly well according to the following statistics supplied by the Statistical Bureau dealing with Fodder and Forage, the imports of which are given for the last five years as under:—

1903	£152,234
1904	47,589
1905	31,311
1906	11,687
1907	5,211

PORTS OF ENTRY.

The total quantity of lucerne imported into British South Africa during 1907 through the different coastal States was as under:—

Cape Colony	£ 103
Natal	11,016
Delagoa Bay	—
Beira	12
	£11,131
Total for 1906 ...	£16,235

In the classified list of exports through the different coastal States, lucerne is not separately specified.

CAPE IMPORTS OF LUCERNE.

In the second Annual Statement of the Trade and Shipping of the Colonies and Territories forming the S. A. Customs Union, we find the following statement of the trade in lucerne, extracted from the Customs Returns:—

IMPORTS FROM OVERSEA.

From	1907. Value.	1906. Value.
New South Wales	£22	—
South Australia	—	£29
France	35	—
Argentine	46	349
	£103	£378
South African Produce ...	7	—
	£110	£378

This shows that as far as the Cape is concerned there is no longer any trade worth speaking of in importing lucerne, the total imports being less than 40 tons weight last year and less than 115 tons in the previous year.

But comparing the weights given with the values, we find the declared value of the lucerne works out as under, per 100 lbs.:—

		s.	d.
New South Wales,	1907 ...	1	1
Argentine,	1907 ...	2	7
,,	1906 ...	3	2
South Australia,	1906 ...	5	6

We have taken our figures as they appear classified under Fodder and Forage, but the great differences in value lead us to infer that lucerne seed has been wrongly included in some cases.

under this heading. This is confirmed by the value of the imports of lucerne credited to France, which figures at 1,160 lbs. of the value of £35, or say 7¼d. per lb., which would be about the value of Provence seed. The statistics of seed imported do not specially mention lucerne, which presumably is included under "Seeds: garden, vegetable and field."

CAPE EXPORT OF LUCERNE.

The statistics showing the export of lucerne are as follows:—

To	1907.	1906.
United Kingdom	£ 6	—
German South West Africa... ...	1,457	—
Portuguese East „	171	—
„ West „	238	—
Ships' Stores...	12	—
	£ 1,884	
Other States in Customs Union ...	27,444	
	£29,328	

1907 is the first year in which the returns have treated lucerne as a special line apart from "Fodder—all other than oathay."

The above figures show that the Cape is already creating a valuable export trade in lucerne.

NATAL.

Apparently the Natal statistics are prepared on a different system from those of the Cape. We find the Natal imports of lucerne have been as under:—

From	1907.	1906.
United Kingdom	£ 27	£ —
New South Wales	39	49
South Australia	2	7
Victoria	—	4
Argentine	10,948	15,805
	£11,016	£15,865
South African Produce	2,807	446
	£13,823	£16,311

This return shows a satisfactory decrease in imports from oversea, and a six-fold increase in imports from countries in the South African Union.

Natal also exported lucerne to Portuguese East Africa to the value of £83, and to other countries in the Customs Union £421.

ORANGE RIVER COLONY.

ORANGIA IMPORTS

of lucerne are reported as under :—

From	1907	1906.
Australia	£ —	£ 130
Argentine	3	101
Other Countries	—	—
South African Produce ...	9,068	7,910
Total ...	£9,071	£8,141

It thus appears that the imported article has practically no chance in the inland markets.

THE EXPORTS of lucerne from Orangia are not separately specified, but the total Fodder and Forage exported "other than hay" (the returns do not state *oat* hay) was, for 1907 £2,404, and 1906 £4,834.

TRANSVAAL.

The Transvaal's dealings in lucerne are thus stated :—

IMPORTS.

From	1907.	1906.
United Kingdom	£ —	£ 28
Australia	3	5
New Zealand	—	2
France	239	—
Argentine	29	1,037
	£271	£1,072
South African Produce ...	15,749	14,183
	£16,020	£15,255

Here again the figures show the import trade of lucerne from oversea has been killed, for the chief item figuring last year (France £239) is evidently lucerne seed as, calculating from the weights given, the value works out at just over 7d. per lb.

The value per 100 lbs. of the Argentine article imported in 1906 works out at just over 2s. per 100 lbs., and that for the South African product at 4s. 8d. per 100 lbs.

Be it also noted that the Transvaal exported lucerne last year to the United Kingdom weighing 837 lbs. valued at £4, or rather over a penny per lb. ; she also exported to other States in the Union 11,944 lbs. valued at £43, or nearly 7s. 4d. per 100 lbs. We can only assume that these figures included lucerne seed.

SOUTH RHODESIA

only classifies its imports of Fodder and Forage under three heads, Chaff, Hay and "all other." Consequently we have no means of ascertaining what her consumption of lucerne is, but as the total of all three classes only amounted to £518 in 1907, and £663 in 1906, the market is evidently extremely limited; the total exports of fodder and forage figure at £17.

NORTH-WEST RHODESIA

imported £16 worth of Fodder and Forage of all kinds in 1907, and £61 in 1906, and exported none.

Customs Payable on Lucerne.

The Customs Union tariff on lucerne is 2s. per 100 lbs., with a rebate allowed on the produce of the United Kingdom, and reciprocating British Colonies of 2d. per 100 lbs.

Lucerne for the Military.

Stores for the British Government are, however, imported free of duty, and therefore the lucerne hay of other countries for the use of the military can be imported free of the above duty.

The military, nevertheless, recognise the desirability of using the South African article when they can procure it at satisfactory prices, and in recent seasons have improved their system of buying. They now buy large quantities of lucerne hay from farmers direct and pay for same when passed by the Army Service Corps, accepting the weights signed for by the Railway Department.

Lucerne Mems.

Lucerne Honey.

IN the Kansas Board of Agriculture report, the following reference is made to the fertilization of lucerne flowers by bees and the production of honey :—

The lucerne blossom is so constructed that it is impossible for it to fertilize itself ; the pollen cannot fall upon the point of fertilization, but must be carried to that point by some agency. From the shape and size of the blossom, it is not probable that cross-fertilization could be safely accomplished by means of currents of air.

It becomes evident, then, that outside agencies must be called upon, and the plant must provide for these agencies. The agents in this case we find to be insects, and the reward offered by the plant for favours rendered is a sweet drop of nectar ; that is, the flower in an enticing way places a tempting sip of nectar in such a position that when the insect has favoured the flower with a few grains of pollen, unconsciously brought from an adjoining blossom, and just as unconsciously left, the coveted sip may be enjoyed. It is evident, however, that the first flower visited will not be cross-fertilized.

A hundred seed pods were gathered from a field twenty-five miles away from any other known colony of bees, and another hundred pods from a field less than one-half mile from a large apiary. The pods of these two groups were counted, and it was found that the pods taken near to the bees averaged two-thirds greater number of seeds, and showed seed larger, plumper, and more uniform in size. And while the bees were conducting this valuable seed-making work, they were likewise garnering a quality of honey which, submitted to all known chemical tests, has proved itself equal if not superior to any other.

It has been my observation, further, that lucerne will yield the greatest quantity of honey under circumstances which tend to give the plant the most vigorous growth. If the plant is upon upland, dry weather will affect the secretion of nectar before it will in a valley where the roots of the plant extend to the water. During a dry period bees will fly over fields in bloom to a field which is irrigated and beginning to bloom.

The greatest activity in apiculture in this State is to be found in the lucerne regions. In the lucerne-growing portions of the State the average yield per hive in 1898 exceeded 60 lbs., while in portions of the State where lucerne was not a prominent factor in honey production, the bees did well to procure a livelihood for themselves, without furnishing a surplus for their owners. Some hives situated in the lucerne region were able to yield that season a surplus of 200 lbs. of comb honey.

The conclusion of the three years' study, briefly stated, are, that the highest returns from the lucerne meadow are to be secured by an early spring cultivation of roots with the disc harrow and a summer visitation of the blossoms by the honey-bee.

Lucerne for Pigs.

A correspondent of the Texas *Farmers' Advocate* writes thus on cutting lucerne for hogs :—

We want to again call the attention of Kansas farmers to the profit to be made by specially preparing lucerne hay for hogs. In bulletin No. 95 we give the results of our experiments with lucerne hay for fattening hogs. These experiments showed that early cut and carefully cured lucerne hay fed with grain gave a gain of 868 pounds of pork per ton of hay fed, and lucerne hay cut late and poorly cured, with the loss of many leaves, gave a gain of 333 pounds of pork per ton of hay fed. The fattening hogs fed on lucerne hay made rapid gains and had that slick, smooth hair and thrifty appearance shown by amimals fed on oil meal. No other feed has yet been tested that has secured such results at so low a cost as lucerne hay.

The experiments show strongly the value of carefully curing the hay. The early cut, well-cured hay produced 535 pounds more pork per ton than the late cut and poorly cured. This difference will pay for all the additional labour needed to produce the best quality of hay and then have a large profit.

It is the protein in hay that produces the large gains, and the lucerne should be so handled in curing as to secure the greatest amount of this material. To do this the first care should be to save the leaves. Geo. L. Clothier, in "Forage and Fodders" (quarterly report of the Kansas State Board of Agriculture), has given a compilation of many analyses of lucerne and shows lucerne leaves to contain 22.6 per cent. protein and the stems 6.3 per cent. The hog raiser wants to save all the leaves possible.

A comparison will show the value of lucerne leaves. Gluton meal contains 24 per cent. of protein, lucerne leaves 22.5 per cent., and bran 16 per cent. It is not uncommon to go into a field where lucerne hay is being made and find from one-third to one-half of

the leaves scattered and lost, and a ton of carefully dried leaves contains as much protein as 2,800 lbs. of wheat bran. The leaves make up almost one-half the weight of the whole plant. A heavy rain will wash away from one-third to one-half the protein in lucerne.

Direction cannot be given for making lucerne hay, because the weather, thickness of stand, and other conditions vary so much, but cut and handle so as to cure with as little handling and exposure as possible.

Our experiments show that fattening hogs need about one ton of well-cured lucerne hay with each 250 bushels of grain. Stock hogs should be fed two or three times this amount.

Early cutting produces the best quality for hogs, and also for cattle and sheep. In recent digestion experiments with lucerne the chemical department of this station found the following differences :—

Lucerne.	Total Protein per cent.	Digestible Protein per cent.
Cut when 10 per cent. of stalks were in bloom	18.5	14.5
Cut when half the staiks were in bloom	17.2	12.9
Cut when in full bloom ...	14.4	11.4

The digestible part is all that produces gain. Wheat bran contains 12.3 per cent. of digestible protein, and these trials show that the earlier cutting was worth one-fifth more, ton for ton, than bran.

Both fattening and stock hogs should be fed regularly twice a day through the winter with all the choice, early cut, carefully cured lucerne hay they will eat. This quality of hay is just as valuable for steers, cows and young stock as it is for hogs, but it is often impossible to save all the crop in good condition, and as only a small quantity is needed for hogs, we urge lucerne growers to take unusual pains to secure enough for their hogs that is cut at just the right time and perfectly cured.

Enriching the Land.

The Colorado Agricultural Experiment Station, in an instructive pamphlet, points out that the excellent results observed to follow putting land down to lucerne for three or more years, leads to the conclusion that it enriches the soil. In a certain sense this is the case. The practice of seeding run-down land to lucerne, and leaving it in lucerne for several years before breaking it up again to plant other crops, has been the salvation of a great part of Colorado, and yet it does not follow that the lucerne plant does not

require a large amount of plant food. There are but few crops which will equal lucerne in its draft upon the resources of the soil in which it grows, but while other crops gather their food from a depth of 2, 4 or 5 feet, lucerne gathers its food from depths ranging from 6 to 12 feet—so on the assumption that the lucerne plant has no greater power to gather its food than the wheat plant, for example, it has, owing to the greater depth to which its roots penetrate, from three to four times the depth of soil to feed on. This is an essential advantage, especially if the upper portions of the soil from which the wheat plant is to draw its food has already been partially exhausted by repeated cropping, as has been the case in many instances in this State. That the plant requires a large supply of plant food is very evident, for we find it contained in the plant, but its little feeding roots which gather this food are almost wholly below the depth at which ordinary crops feed, so this portion of the soil is resting while in lucerne.

Compulsory Eradication of Dodder (Cuscuta).

This has been declared a noxious weed, in the following divisions of the Cape Colony :—

Aberdeen	Jansenville	Robertson
Albany	Ladismith	Somerset East
Bedford	Middelburg	Steynsburg
Clanwilliam	Murraysburg	Tarka
Colesberg	Oudtshoorn	Uitenhage
Cradock	Prince Albert	Uniondale
Graaff-Reinet	Queenstown	Worcester

Act 17 of 1907.

The old Noxious Weed legislation was found to be insufficiently drastic to deal with Dodder, and last year a Bill was introduced to give greater powers to Divisional Councils to promptly and effectively take measures to exterminate it. The Act was promulgated on the 17th September, 1907.

The following are the principal provisions of the Act :—

Clause 1 empowers Divisional Councils to petition the Governor to be vested with the additional powers conferred by the Act. Upon receipt of such petition the Governor shall declare the Act in operation in the divisions, and the following provisions shall be in form and effect and read as one with sub-division 6, part 1, of the Divisional Council Act of 1889, viz. :—

(a) The Secretary . . . shall in . . . respect of the weed called " Xanthium Spinosum " (bur-weed) or any other weed or

plant which the Governor may . . . have required . . . to be dealt with . . . cause to be published a public notice in the English and Dutch languages, warning all owners and occupiers of land within the division of the liability they will incur under this Act by neglecting to eradicate or destroy the noxious weed or plant named in such notice.

(b) Upon publication of such notice it shall be the duty of every owner or occupier in such division upon whose land the noxious weed or plant referred to in such notice is found, to eradicate or destroy the same forthwith, . . . and unless such owner or occupier shall before a date to be fixed in such notice assign good and sufficient reason to the satisfaction of the Council for not complying with the notice . . . such Council is hereby required to employ all labourers necessary for eradicating or destroying the said weed or plant, and all the costs and charges thereby incurred shall be recoverable from such owner, or occupier, with costs, . . . or, . . . the said Council may, if it think fit, sommon such owner or occupier . . . to answer for his neglect to eradicate or destroy such weed or plant, and upon proof of his neglect such owner or occupier shall be deemed to be guilty of an offence under this Act, and shall upon conviction be subject to a fine not exceeding twenty pounds and such owner or occupier shall be liable to the same penalty for every week or part of a week during which he shall fail, after his first conviction, to comply with the notice aforesaid.

In the eradication of noxious weeds it shall be an offence to place such weeds in any river or in any defined water causes. Any person contravening this section shall upon conviction be liable to a penalty not exceeding twenty pounds.

Act 17 of 1907 has already been proclaimed in the following divisions :—

Aberdeen	Jansenville	Queenstown
Albert	Knysna	Riversdale
Alexandria	Kuruman	Robertson
Aliwal North	Komgha	Somerset East
Beaufort West	Ladismith	Steynsburg
Barkly East	Laingsburg	Stockenstrom
Bedford	Malmesbury	Swellendam
Bredasdorp	Molteno	Tulbagh
Cradock	Mossel Bay	Van Rhynsdorp
Colesberg	Murraysburg	Vryburg
Fort Beaufort	Oudtshoorn	Willowmore
Gordonia	Prince Albert	Wodehouse
Hay	Paarl	Worcester

Manuring Lucerne.

At the Government Experimental Station at Robertson, some interesting experiments in testing the effect of manures on lucerne are being carried on.

In the Karroo it is generally assumed that owing to the richness of the soil there is no occasion to manure it, and old lucerne lands are known to continue to yield prolific crops after many years of repeated cuttings. The result of the experiments, however, goes to show that, marvellous as is the return from an acre of established lucerne, the yield may be greatly increased by the addition of suitable manure.

At Robertson a plot of lucerne was given 800 lbs. of super phosphate per acre. The strength of the dressing was what is known as 33-35, that is it contained that percentage of phosphate. The cost was £4 10s. per ton or £1 16s. per acre. The manure was applied early in the season. Off this plot the yield was five tons more than off the unmanured area, and this at £5 per ton gave a return of £25 for an outlay of £1 16s. on manure, or hay was produced at under 8s. per ton. The actual figures are : Total weight of four cuttings, no manure and 800 lbs. super sulphate, 5,320 lbs. and 17,200 lbs. lucerne hay per acre respectively.

But another most important effect is produced by manuring with *suitable* manures. The more luxuriant the growth of lucerne, the more certainly are the weeds smothered, and the kweek grass that so infests many lucerne lands has no chance in getting established. Those who have not studied the effect of manures might naturally infer that what was good for the lucerne was good for the kweek, but it is not so. Different orders of plants require different food, and whilst grasses *(graminiæ)* require nitrogen, lucerne and other leguminous crops *(leguminosæ)* by the aid of bacteria fix atmospheric nitrogen and require chiefly phosphates, potash and lime; when supplied with this food they grow so much more rapidly and luxuriantly than the grass, that the latter gets no chance.

In the wide field of agriculture there is nothing more dangerous than to generalize from a particular. The chances are that most of our Karoo soils contain sufficient potash and lime to grow most abundant crops of lucerne, yet is is conceivable that some potassic manure, used along with super phosphate, might give profitable returns. In some cases, too, basic slag might be better than super phosphate, and doubtless in many instances smaller dressings than 800 lbs. per acre would be more remunerative. All these points, however, can only be ascertained for *each* farm by experiments conducted thereon. The *general principles* of manuring are perfectly well known to science, but their application to particular cases can be ascertained only by experiments or actual tests in the particular case.

We trust some lucerne growers will also try experiments for themselves and let us have the results of their experience. The

figures given above certainly go to show that the last word has not yet been said in the cultivation of lucerne, and that those who have already found money in lucerne may still go one better.

Lucerne Profits.

(By the Director of Irrigation.)

All the calcareous soils of the Karroo and the fertile alluvial valleys nearer the coast, which have been formed with the washings brought down by the Karroo rivers, are eminently suited to the cultivation of lucerne, provided the soil is not too shallow, nor "brak," and is well drained. Lucerne in the Cape Colony responds to irrigation and cultivation to a degree hardly credible, and unknown elsewhere. For many months I have been endeavouring to collect information and authentic statistics regarding the cultivation of this crop, which will ultimately be of some value to farmers. Disregarding extraordinary out-turns to which specially favoured localities give rise, I think it safe to say that the average net profits accruing to a lucerne farmer amount to from £9 to £20 per acre per annum, these rates being based upon the sales of baled lucerne hay. If lucerne is not baled, but used on the farm for feeding stock, the profits are still greater. According to a statement made by a well-known ostrich farmer at one of the meetings of the Cradock Farmers' Association, a net profit of £30 per acre of lucerne per annum can be made. In my present argument I am content to assume a modest profit of £10 per acre per annum only. Now, with such returns in view, it is obvious that farmers are encouraged to lay out capital on irrigation works and in laying out their lands to lucerne. Where there are natural possibilities, the capital cost of the works is paid for within a year or two, but even more ambitious and expensive schemes, costing £20 to £30 per acre irrigated, become feasible and financially sound. One great fact must be borne in mind, viz., that lucerne once established on suitable soil continues to give its full yield for an indefinite number of years, and while doing so is continually improving the soil, Again. whilst lucerne is now being grown mainly for hay, and sold in Johannesburg or to the military authorities, or otherwise for feeding ostriches, farmers have yet to realise the great value of lucerne for almost every kind of stock, large or small, also for poultry. The farmers in the Western States of America are growing wealthy by feeding lucerne to cattle, horses, pigs, sheep, poultry, and even bees, and there is no reason why this country should not do likewise. It is evident that farmers are now waking up to the advantages of irrigation in parts where immediate and handsome profits are the reward of enterprise, but in the tracts in most urgent need of irrigation, largely owing to the conservative and backward state of the farmers settled there, much education and encouragement are required before things are as they should be.—1907 Report.

Lucerne: It's Feeding Value.

(By R. W. THORNTON, Government Agricultural Assistant.)

SPEAKING at the quarterly meeting of the Zwart Ruggens Farmers' Association on the 27th October, 1908, Mr. R. W. Thornton, Government Agriculturist, said :—

The reason for choosing this subject is, firstly, because Graaff-Reinet is a good stock district, and secondly, because your district, like most of the Midlands, suffers from drought at different times, and quantities of foodstuffs are purchased from time to time. What I wish to point out is the absolute necessity of changing diet for our stock or the use of

COMPLETE FOODS,

and secondly, to find out the relative value of different fodders offered on the market at different times, so as to enable us to see which is the cheapest for us to purchase for any special purpose.

Practically the only two complete foods we have are milk and eggs. These contain nitrogenous matter and non-nitrogenous matter in the right proportion to each other that support animal life in all its parts. By nitrogenous matter is meant roughly the material which gives muscle and strength. The non-nitrogenous matter is composed largely of starch, sugar and fats, which produce heat and force. The proportion between nitrogenous and non-nitrogenous digestible constituents in a food is of the greatest importance, as upon this the economical and successful feeding of animals depends. This proportion is called the albumenoid or or nutritive ratio. By working out this ratio from the analysis of any food, its value for any special purpose such as fattening stock, growing feathers, etc., can be arrived at, and by the unit system of valuation the actual money value of a food can be ascertained. In the unit value albuminoids are worth three times the value of starch and sugar, and the fat two-and-a-half times the value of starch and sugar.

FEEDING VALUES OF LUCERNE CUT EARLY AND LATE.

Thus in an over-ripe sample of lucerne we have 10 per cent. of albuminoids, 19.5 per cent. of carbohydrates, 1 per cent. of true fat, and 84 per cent. of dry matter. This gives us 52 units of digestible matter, which at a shilling a unit gives us £2 12s. per ton. Lucerne cut at the right stage, when just coming into flower, gives us 12.3 per cent. of albumenoids, 31.4 of carbo-hydrates, 9 per cent. of crude fat, and only 76 per cent. of dry matter. This lucerne gives us 71.55 units of digestible matter, value £3 11s. 6d. per ton, which shows a distinct advantage over the lucerne at £2 12s. a ton, though in all probability these two will both fetch the same price in the market, though the one is far more valuable for feeding than the other.

DIET FOR DIFFERENT CLASSES OF STOCK.

Then, taking the actual feeding of stock for any special purpose, there are several questions to be considered. First, taking

SHEEP AND GOATS,

we wish to produce the best mohair and wool, especially for show purposes, at the smallest cost; and secondly, to feed our rams with a strength and energy-giving food, so as to get the greatest number of lambs and kids from good stock during the season. On ordinary feeding a ram may give, say, fifty lambs. If this number can be doubled by good feeding, we have doubled the value of the ram. Then taking

POULTRY,

no matter what the breed or how well they are looked after, we cannot hope to get the best results, as far as egg-laying is concerned, if we do not feed with a suitable diet for egg production. One such diet would be :—1 part pea meal; 3 parts bran; 3 parts pollard. Two ounces of this mash to be given to each fowl in the morning, half an ounce of green bone at noon, and in the evening two ounces of wheat. This food will not cost more than any of the single ingredients present, but will force the fowls to lay double the number of eggs, and therefore double their value. With regard to

PIGS,

the object is to lay on the greatest weight in the shortest time, and also to secure good quality. For this purpose a mixture of two parts of bran, three parts of barley, one oats, two mealies, and one molassine meal will give the desired result, and pigs fed on this mixture, at the rate of 5 lbs. to every 100 lbs. live weight, will give a daily increase in weight of 1½ lbs. to 2 lbs. on every pig. Then selling pork at 4½d per lb. live weight is indeed a profitable business.

can also be fed on different rations for milk production with equally good results.

Before concluding, I may mention that at Glen Harry farm all the ostrich chicks that are hatched are divided between the two brothers (Messrs. W. S. and G. Probart). Those running partly on the veld with very little lucerne, though coming from the same hatchings, are doing far better in every respect than those running on lucerne alone, again showing the want of a change.

The main object of my lecture is to point out to farmers that when different fodders are being offered on the market, even if the one be double the price of another, it is quite possible that the more expensive of the two is actually far the cheaper, owing to the quantity of feeding matter contained.

In reply to Mr. Tom Murray, Mr. Thornton said that the best combination for horses would be lucerne and oats; for cattle, lucerne and mealie meal would be the best food; for ostriches mealies and lucerne would produce more fertile eggs than lucerne alone.

The Government Agriculturist replied to a Roodebloem questioner, *re* feathers, to the effect that he had not yet had sufficient proof, but from experiments on poultry it was demonstrated that one must have something to support the strength of the feather and the bird, and therefore one must have something fatty.

Lucerne Implements.

The Cultivator Trial.

LUCERNE cultivation has produced a call for new implements, and as "queek" grass especially proved a troublesome weed, Mr. H. J. Collett offered a £20 prize at the 1907 Show of the Cradock Agricultural Society for an implement that would remove it, the prize to be awarded after practical field trials conducted by a special Committee assisted by Mr. Lawford, C.E., as expert adviser. On the occasion of the trials the farmers present felt that while the trial of competing implements had been very useful, there existed a need for something better that had yet been tried, and four enthusiastic lucerne growers soon guaranteed a £100 prize for the best implement produced at the 1908 Show.

The prize of £100 was accordingly offered by the Cradock Agricultural Society in 1907 for the best lucerne cultivator, the field trial to take place in 1908. On Monday, March 2nd, 1908, there was a big gathering of farmers from all parts of the Colony at Mr. Hilton Barber's farm, Halesowen, to witness the contest. Eleven implements were entered. The lands were not in a good condition for the trial, being dry and tramped hard by the birds during the drought, but upon the day's work the honours fell to Mr. Llewellyn Roberts (a practical farmer who has also invented a patent gate and fencing machine), with an implement consisting of two gangs of spiked rollers following each other, and in turn followed by a spring tooth harrow attachment, which can be put in and out of action at pleasure. This harrow is fitted with teeth specially designed not to cut the lucerne roots, and it is claimed that on ordinary ground it will give a perfect tilth 6 to 8 inches deep.

In their report the Judges say :—

The following implements took part in the trials :

Messrs. Dunn & Co.'s "Sandow"; Mr. A. L Grobbelaar's new spiked roller Messrs. Howard Farrar, Robinson & Co.'s disc Cultivator with spikes attached, and "Champion" Cultivator No. 7 ; Messrs. Malcomess & Co.'s "Martin" Cultivator, No. 1, and the same firm's special double action cutaway disc ; Messrs. Philip Bros.' "Sandow"; Mr. L J. Roberts' new patent double rotary digger with harrow attached; Messrs. M. M. Steytler's "Osborne," smooth disc ; Mr. W. Thomas's "Martin," with seven tynes, and the same make with nine tynes.

We, the undersigned Judges, unanimously award the First Prize to L. J. Roberts's Cultivator, the "Lucerne King." We consider this implement does excellent work, cultivating to a good depth and leaving the ground in a fine state of tilth with a good even surface. It is a well designed implement, strongly constructed and of excellent material. The arrangement for lifting it out of the ground is ingenious. This consists of a long lever with a clutch, which hooks into the wheel and causes the team to lift the teeth and raise the implement on to its travelling wheels. The draft is heavy, but is compensated for by the good thorough work it does. We consider the spring tooth harrow attachment almost unnecessary, and its removal would reduce the high cost of the implement.

(Signed) E. T. Gilfillan.
H. J. Collett.
Montague Gadd.
Geo. B. Rayner.
R. A. Hockly.

It was felt during the contest, however, that no one implement was likely to prove the best for old soils, and that with such varying conditions as we have in South Africa no single implement is likely to gain the monopoly. The trial was of the highest educational value, as practical men were well able to see various types of machines side by side and to discuss their good points, and bad in design and construction. The trial was a severe one, and on the day's work and conditions the result was soon pretty shrewdly guessed by those present.

Storing Lucerne under Cover.

MR. RICHARD GAVIN, the father of lucerne farming in the Cape Colony, wrote to the first edition of this work his experiences in Lucerne Haymaking. The following advice on storing hay under cover is yet of sufficient importance to be reproduced. Mr. Gavin says :—

A house is the best to store lucerne hay in, for if there is only one load dry it can be stored away and no trouble to cover it for fear of rain. The second best plan to store it away is to make a rick about 20 feet wide, build it up as high as it can be forked from the wagons, say about 14 feet high ; build it nearly perpendicular, but very little wider as it goes up ; press it as close and firm as possible by walking on the top ; slope the top the same as a flat-roofed house and cover with iron in a similar manner, only that it is not screwed on. When the iron is on, place long pieces of wood across the plates, then places wire across the wood and fasten weights to the ends of the wires ; also place a few pieces of wood across the iron to make them lie smooth. When done in this way there is no fear of the wind removing the iron, although it blows strong. When the hay is required remove as many of the plates as you think necessary, and cut the rick across in sections with a hay knife, and there will be no waste of hay. My plan to build a hay house is as follows :—It may be any width ; the walls about 18 feet high ; pitched roof, with no loft ; door in the end, about 10 ft. wide and 9 ft. high ; large windows on lee side, having the bottom of the windows about 7 feet above the ground outside, so that the hay can be forked from the wagons into the house. When the hay rises above the level of the bottom of the window, it can be forked from that to the top of the house with ease. When the hay is required to be taken out of the house commence at the door, cut across in sections with hay knife as with the rick, and you will find that there will be no trouble in removing the hay. In having the door very large, it can be used for wagons and live stock when not required for hay. The floor of the house must be high and dry. The best foundation for a rick is stone. A good plan to find out whether hay is heating or sweating is to take a long bar of iron with a sharp point and drive it into the middle of the stack. Leave it for about 10 or 12 hours, then pull it out, and if it is hot and wet the hay should be removed at once, as it is likely to get damaged. If it is not hot or wet it is all right. If hay is required to be chaffed for ostriches, it is economical to have a large chaff-cutter worked by horses or mules. I have had one for years which I work with four or six horses or mules, and I can vouch for the great saving of labour. If lucerne is chaffed and fed to ostriches green, a farmer can keep 100 birds, whereas he would not be able to keep 20 if allowed to graze on the same land.

Ostrich Incubators.

Which? **CYPHERS**

Why? = Proved The Best

Where? Everywhere.

Who? = **BLAINE & CO.,**

AGENTS,

PORT ELIZABETH.

Send your

PRODUCE

TO

JAS. LAMB,

THE

Old-established Produce Dealer,

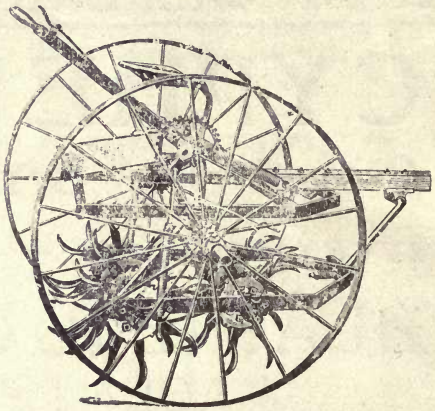
Port Elizabeth,

IF YOU WANT SATISFACTION.

— UP-TO-DATE —

CULTIVATORS

The Martin's

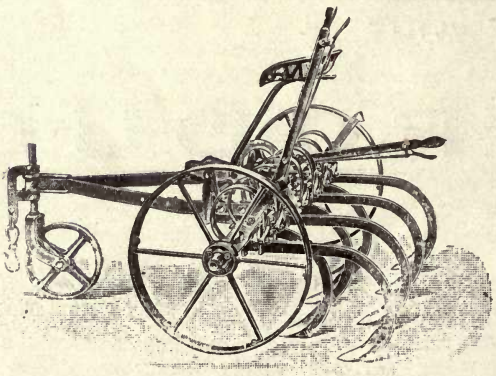


Cultivators

DEFY COMPETITION. —

The Martin's Machines are specially built for Lucerne fields, when the surface is baked hard and dry, and are the only implements which will perform this work without being specially weighted. We maintain that it is impossible to design a machine which will work with equal success, in hard dry ground and also in soft irrigated ground.

WE ALSO STOCK
LUCERNE PRESSES,
HAY LOADERS, &c.



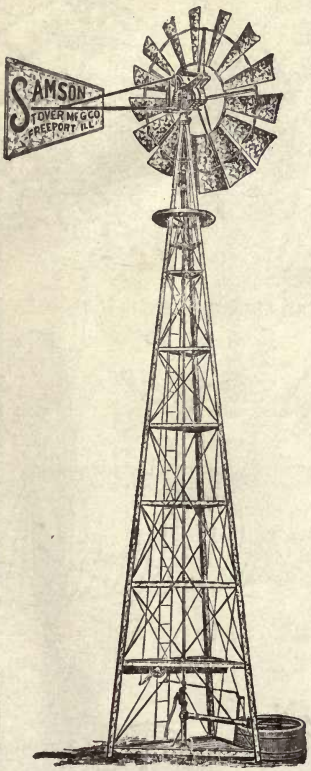
— THE MOLINE —
LUCERNE CULTIVATOR
FOR IRRIGATED LAND.

This implement has created the widest and most enthusiastic interest amongst Lucerne growers. In soft moist soils and irrigated land this is the finest Lucerne Cultivator made, the teeth swing loose on the disc, and therefore the digging action is very gentle and does not damage the plants

MALCOMESS & CO., Ltd.,

Estd. 1870 EAST LONDON & DURBAN.

DON'T STOP



to consider whether you can afford it, but make up your mind to-day to buy ——————————

A SAMSON

without delay, as it is the very best ——————————

WINDMILL

you can possibly buy. ——

A FARMER well known in the Midlands writes to us sending us a testimonial about 3 Samson Windmills he bought from us, and says "by means of which I have REARED 400 pounds worth of OSTRICH CHICKS throughout the unprecedented drought." Write for particulars and prices to——

MALCOMESS & CO., Limited,

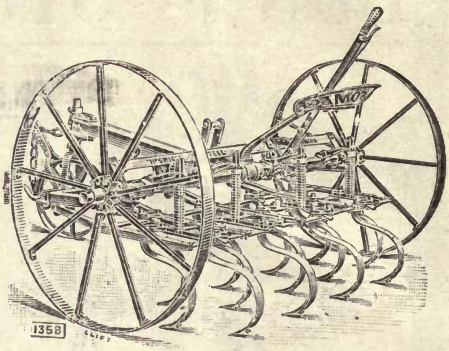
EAST LONDON.

MANGOLD BROTHERS,

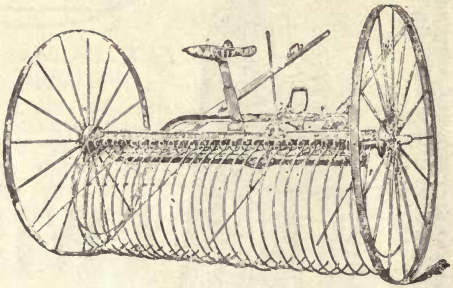
Agricultural and General Engineers,

PORT ELIZABETH & BLOEMFONTEIN.

First Prize, Port Elizabeth Agricultural Show, 1908.
Latest Improved & most Up-to-date Mill on the market.



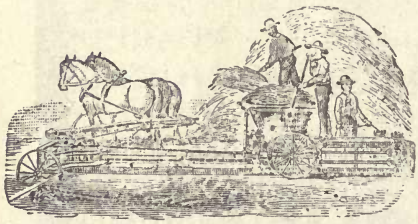
Ransome's Cultivators.



Wood's Horse Rakes.

Wood's 'Special' Lucerne Mowers.

Catalogues & Price Lists on application.



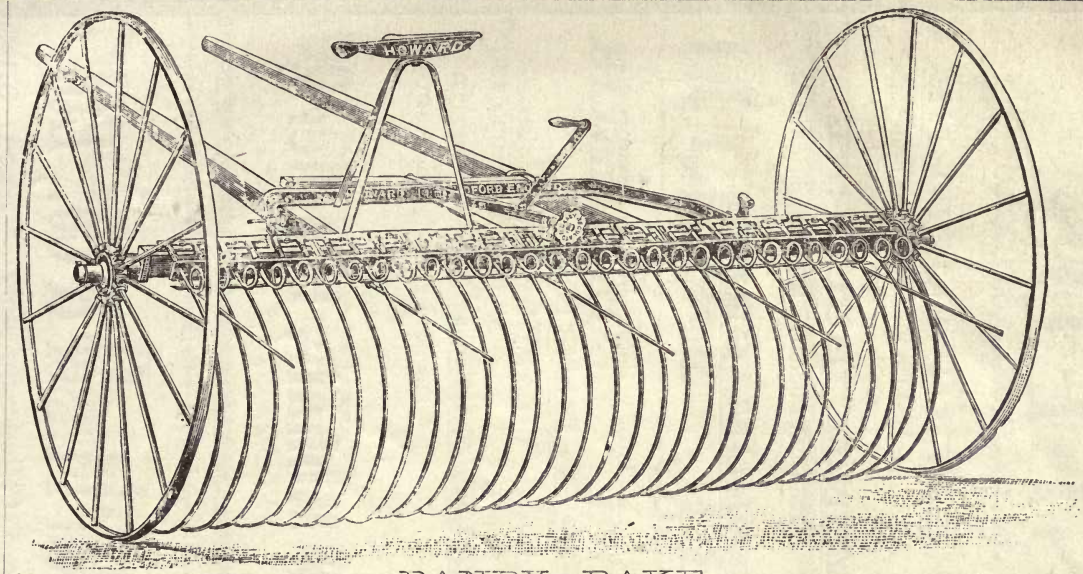
Whitman' New Model "Steel Beauty" Lucerne Baling Presses.

SOLE MANUFACTURERS OF THE

ROBERTS' "LUCERNE KING" CULTIVATOR

Winner of the £100 Prize
Awarded by the Cradock Agricultural Society, 1908.

BUY THE
DANDY HAY RAKE
AND THE NO. 9
ALBION MOWER,
And you will be pleased with them.



DANDY RAKE.

HOWARD'S
LUCERNE PRESSES
Are the Latest and most Modern patterns on the market.

Write to us for particulars of HOWARD'S DISC HARROWS & CHAMPION CULTIVATORS FOR LUCERNE CULTIVATION.——Catalogues FREE from

HOWARD FARRAR, ROBINSON & CO., Ltd.,
Engineers and Machinery Merchants, PORT ELIZABETH & EAST LONDON.

SEEDS.

TURKESTAN LUCERNE,
Free from Dodder. For dry and brak soils.

PROVENCE LUCERNE,
Free from Dodder. Highest germination.

PASPALUM GRASS,
For warm, moist soils.

MELILOT,
A Clover variety. For poor sandy soils.

SHEEP'S BURNET,
Eaten by all stock. For cold, dry districts.

FESCUE, or Southey's Tussock Grass,
A splendid grass for the Karroo.

Wool, Mohair, Feathers,

&c., &c.,
SOLD TO BEST ADVANTAGE.
LIBERAL ADVANCES. PROMPT SETTLEMENTS.

Stephen Fraser & Co., Ltd.

(Wholesale only),

Port Elizabeth.

J. OWEN COLLETT,

Tafelberg Station.

Breeder of PURE DOUBLE FLUE OSTRICHES. Also others crossed with the Barber strain. Valuable pairs on hand.
Breeder of CARRIAGE HORSES and COLTS suitable for Entires to light class Mares.
Breeder of a HARDY TYPE OF BULL.

No loss in Cattle for years. Cross Devon with Africander.

LUCERNE SEED.

"BLUE CROSS" BRAND

IS THE BEST.

90 per cent. Germination. 97½ per cent. Pure.

GUARANTEED FREE FROM DODDER.

——WHOLESALE ONLY.——

ADOLPH MOSENTHAL & CO.,

PORT ELIZABETH.

Special Ostriches.

Choice Pairs £50 to £100 per pair.

F. W. BAKER,

"LAUGHING WATERS," WILLOWMORE.

THE PEARSTON

Law, Estate and General Agency.

A. P. MYBURGH, J.P.,

Admitted Law Agent,

Sworn Appraiser to the Master of the Supreme Court,

AND

AUCTIONEER.

Address: P.O. Box 4, PEARSTON.

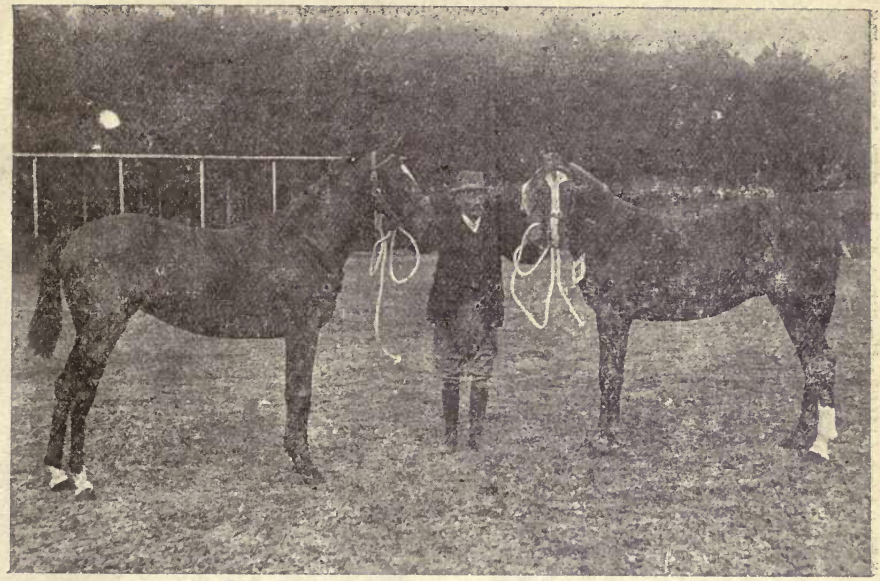
Telegrams: "Myburgh."

Stock bought & sold on commission.

FOR SALE:

Pastoral and Agricultural Farms.

The rich valleys of the Vogel River and its tributaries are still practically undeveloped. Bargains in Farms suitable for irrigation by flood water may still be had. The average rainfall in Pearston for the last five years is 13.8. Pearston Farms are singularly suitable for Ostrich and Angora Goat farming.



ARUNDEL STUD, C.C.

(ABE BAILEY).

THOROUGH-BRED HORSES. HEREFORD CATTLE. MERINO SHEEP.

STUD SIRES.

HORSES:—"STUART." Flora McDonald—Exile II. (Hermit).

"SIDUS." Star of Fortune—St. Simon.

CATTLE:—"CHAIN ARMOUR." Armour Plate—Patience. S.A Stud Book No. 24. H.H.B. 19838.

"SAMSON." Perfection—Damson. H.H.B. 22450.

SHEEP:— "THE WIZARD." Magician—Royal Dream—Royal Hero. Bred by Jas. Taylor, "Winton," Tasmania. Purchased Melbourne Stud Sheep Sales, 1907, for £500.

"CORDITE." Amberite—President.

Prizes won at the three principal Shows exhibited at in 1908.

4 Championships, 2 Silver Cups, 19 First and 7 Second Prizes.

Our Hereford Cattle hold an unbeaten Record for 1908.

M. B. WEBB, Manager.

Free Specimen Copy on application.

There is only one

"African Monthly."

1s.

Over 100 Pages original African literature every month. = = =

UNIFICATION.

Science, Art, Literature, Poetry, Fiction, Music, History, Exploration, Travel, Education, Politics.

Subscription: 12s. per annum, including postage.

AFRICAN BOOK COMPANY, Ltd.,
Box 51, GRAHAMSTOWN.

OSCAR E. G. EVANS,

MELROSE,

P.O. Eastpoort Siding,

Cape Colony.

Breeder of the Celebrated Strain of

"Double Fluff" Ostriches.

Winner of the First Prize for the best one pound weight of Prime White Ostrich Feathers at the Premier Show in South Africa (Port Elizabeth) for six years **in succession**, also most of the best prizes in other classes.

Winner of most of the best prizes at many other Shows in Cape Colony.

Breeder of Ostriches registered in the South African Stud Book.

High-class Breeding Ostriches

ALWAYS FOR SALE; ALSO

Chicks.

IMPORTANT TO LUCERNE GROWERS.

All our Seed is tested as to purity and germinating power by Government experts previous to shipment. Certificate sent with each consignment. —We buy first hand and in large quantities, so are able to procure the BEST seed at a reasonable price. It is impossible to buy reliable seed at a low price.

LUCERNE SEED.

Every description of seed the farmer buys is liable to certain impurities of various kinds and in varying proportions. Even when the greatest care has been taken in harvesting and dressing the seed, absolute purity cannot be guaranteed; and if this is the case when scrupulous care is exercised, it needs no great stretch of imagination to picture what the result will be when no special pains are taken to protect the seed from contamination or to free it from impurities already present. Generally speaking, the smaller the seed the more susceptible it is to adulteration, intentional or accidental. Grass, clover and turnip seed, for instance, are more likely to contain impurities than the larger cereals, although defective germinating power is as probable in the one case as in the other. So many varieties of the smaller seeds resemble each other in size, shape and colour that detection of adulteration is difficult, even to experts—it may be impossible to the naked eye—and this similarity provides the careless and unscrupulous with opportunities for profiting by indifference on the part of buyers. No description of seed apparently is more subject to imperfections in purity and fertility than that of lucerne. This, at all events, is the case as regards the American supply, and, as a crop is grown extensively in the United States, and is, in fact, one of the most important crops of that country, it may be concluded that the same necessity for thorough investigation of the seed purchased exists in his country. Lucerne is not grown on so large a scale in Great Britain as it ought or is likely in future to be, but limitation of the area does not warrant indifference as to the character of the seed sown, and hence, in the light of American evidence, concerning the risk incurred in the selection of seed, it is imperative that every pound of lucerne seed bought should be tested as to purity and germinating power.

Lucerne seed, in addition to being similar in appearance to many other sorts, **is expensive, and the high price it commands may be regarded as an extra incentive to trade negligence as to its purity.** The loss arising from the impurity of the seed supply has been so great in the United States that the Agricultural Department at Washington and several of the experimental stations deemed it advisable to carry out systematic investigations, and the result is some startling revelations. The Washington authorities, for instance, found in one pound of lucerne seed, bought promiscuously, 32,420 noxious weed seeds; in another 23,082: and in a third 21,848. Of the first-named sample less than 59 per cent was lucerne, less than 29 per cent. was germinable, and among its impuritieswere 5,490 seeds of parasitic dodder. Another of the samples contained only a fraction over 5 per cent. that would grow, while in a third the fertile lucerne seeds constituted only slightly over 6 per cent. of the whole. The results of the experiment stations were not quite so startling; but at the Ohio Station it was found that a pound of one lot of so-called lucerne seed contained 18,144 lambs' quarter or pigsweed seeds, and a similar quantity of another sample included 6,420 seeds of crab-grass and 3,325 seeds of foxtail. The seriousness of these impurities may be gathered when it is mentioned that seed which was bought at 32s. 6d. per bushel actually cost 53s. when the foreign seeds and worthless material were removed. Supposing that the samples referred to had been sown as they arrived on the farm—as doubtless they were in many cases—disappointing results were inevitable. Not only would there be a poor crop of lucerne, but the land would be stocked with objectionable and tenacious weeds which it would take years of incessant labour to eradicate. The mischief that results from sowing impure seeds of any description, therefore is not restricted to a deficient yield of the crop intended, but the foundation is laid for tedious and expensive weeding in subsequent years. The danger incurred in the purchase of seeds emphasizes the importance of procuring the supplies from reputable sources.

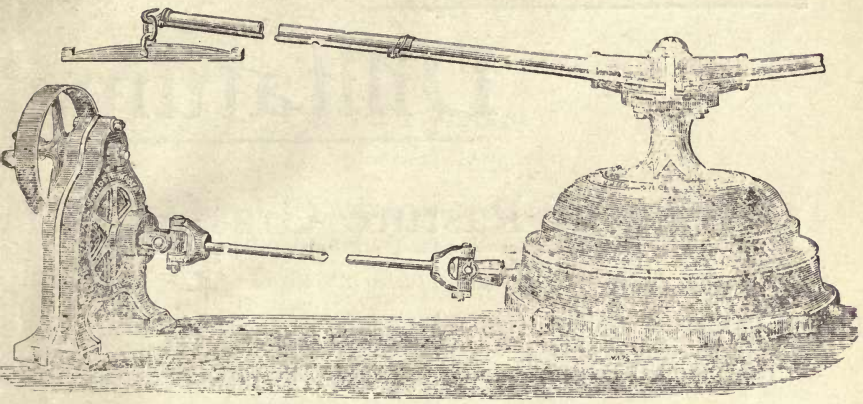
We have over twenty years' reputation at our back in this line, and our references are—the principal growers of Lucerne in this country. —We guarantee our Seed to be genuine Provence-grown, and the best quality to be obtained —Samples and prices on application.

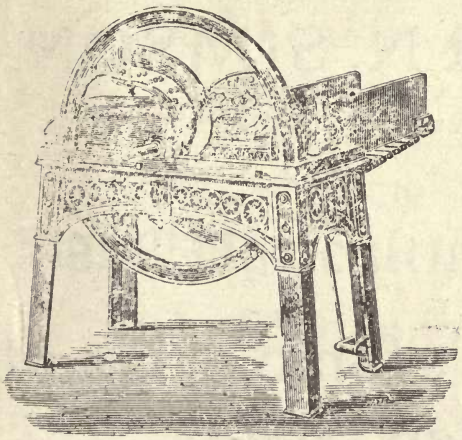
Gingell, Ayliff & Co.,

Commerce Street, **PORT ELIZABETH,**

W. THOMAS'S LUCERNE SEED,

Guaranteed Free from Dodder.





Horse Gears,
Chaff Cutters,
Mowers,
Side Delivery Rakes,
Martin's Cultivators,
Special Plows,
AND

All sorts of suitable Implements
FOR LUCERNE CULTURE.

W. THOMAS,

Queen Street, Oudtshoorn.

Telegrams: "THOMAS," Oudtshoorn.

Paspalum Dilitatum.

King of Pasture Grasses.

FARMERS, if you want to secure BEST RESULTS from this Wonderful Dairying and Fattening Pasture, send to

HECTOR N. SIMSON,

11, Ritter's Chambers,
Berg Street,
Capetown,

Where you will secure . . .

Seccombe's famous Hand Shaken Seed,

Which is guaranteed genuine hand shaken from the growing crop.

Samples, information and Wholesale quotations on application to the Grower,

W. Seccombe,
Coff's Harbour, N.S.W.

The Times of Natal

(Established 1851).

TWO EDITIONS DAILY.

ONE PENNY.

THE "TIMES" has a large and influential circulation in the Central and Northern parts of the Colony, in the Border Districts of the Transvaal and Orange River Colony, and in East Griqualand.

Covering such a large and important agricultural area it is a valuable medium for Agricultural Advertisements. Farmers, Stock Breeders, Implement Makers and all classes of advertisers testify to satisfactory results from its use.

Advertising Rates on application.

= The =

Natal Agricultural Journal and Mining Record.

The Official Publication of the Department of Agriculture and Mines of the Natal Government.

SUBSCRIPTION: 5s. per Annum, Post Free.

Advertising Rates on application.

The "Times" Printing & Publishing Co., Ltd.,

222, Church Street and Chancery Lane,

Maritzburg, Natal.

C. STARKE & CO., Ltd.,

MOWBRAY, CAPE COLONY.

IMPORTERS OF DODDER FREE

LUCERNE SEED

ALL VARIETIES OF

Agricultural Seeds.

Write for Lists. **Telegrams: "Starke," Mowbray.**

FRUIT TREES, ROSE TREES,
FOREST TREES, GRAPE VINES,

IN ALL THE LEADING VARIETIES.

VEGETABLE SEEDS, FLOWER SEEDS,
AGRICULTURAL SEEDS,

OF EVERY DESCRIPTION. Catalogues Post Free.

C. J. HOWLETT, Botanic Gardens, Graaff-Reinet.

BUTLER BROS.,

Midland House, Cradock,

[ESTABLISHED 1879],

CARRY THE BEST STOCK IN THE MIDLANDS OF

Artists' Materials, Stationery,
Office Requirements,
Fancy Goods, Music, Books.

Thirtieth Annual Price List of
PERIODICALS
Will be sent on application.

Try them for FOUNTAIN PENS.
Various makes kept in stock.

RETURN TO the circulation desk of any
University of California Library
or to the
NORTHERN REGIONAL LIBRARY FACILITY
Bldg. 400, Richmond Field Station
University of California
Richmond, CA 94804-4698

ALL BOOKS MAY BE RECALLED AFTER 7 DAYS

- 2-month loans may be renewed by calling (510) 642-6753
- 1-year loans may be recharged by bringing books to NRLF
- Renewals and recharges may be made 4 days prior to due date.

DUE AS STAMPED BELOW

MAR 25 1999

12,000 (11/95)

YB 46476

575042

SB205
A4M6

UNIVERSITY OF CALIFORNIA LIBRARY

Our Reputation

Is based solely upon

THE EXCELLENCE OF OUR STOCK!

THE FAIRNESS OF OUR PRICES!

THE PURITY OF OUR DRUGS & CHEMICALS!

The careful and prompt attention we give to all orders, large or small!

HENCE OUR POPULARITY!

We pride ourselves specially on our "Veterinary Department," which is always kept right down to date. The latest addition to our stock is

Malefern CAPSULES,

which are now being used extensively by all the leading Ostrich farmers in the country. They are made of pure soluble gelatin, and each contains 1 teaspoonful of the finest Oil of Malefern. No more messy pills to make with flour! No uncertainty as to dosage! Enormous money, time and labour savers! Write for particulars and sample.

LARGE STOCKS OF

Kamala, Carbolic Acid, Malefern, Malefern Capsules, Epsom Salts, etc., etc.,

Always on hand, at lowest rates.

Veterinary Instruments & Appliances

A SPECIALITY!

Distance no object! CALL, WRITE or WIRE your Household or Veterinary requirements to

ARTHUR MILLS & CO.,

CHEMISTS AND DRUGGISTS,

CRADOCK.

[Established 14 years.]